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Independence Hall, Philadelphia
Built 1731-1736. The arcades and small wing buildings are restorations, and not authentic. To the extreme right is Congress Hall

EARLY AMERICAN BRICK MAKING*

BY CARL A. ZIEGLER, A. I. A.

Illustrated by photographs by Ph. B. Wallace

IT is certainly most appropriate that the Brick Manufacturers' Association of Eastern Pennsylvania, Southern New Jersey and Delaware should meet in Philadelphia as there is no other city in the country that was so largely influenced by the use of brick construction in the Colonial days and no other city can exhibit so many excellent early examples of this type of architecture.

The late Dr. S. Wier Mitchell wrote his splendid book on "The Red City" with this in mind and Philadelphia was familiarly known as the brick city in the early days when it was the metropolis of the Colonies.

Unfortunately few Americans realize what a heritage they have in the old brick buildings of this country.

If you have ever made a pilgrimage in search of old Colonial brick buildings you have probably observed that the first fact the "oldest inhabitant" attempts to impress you with is that the "bricks were all brought from England."

Most of these imported bricks belong in the same category as the furniture which is reputed to have come over in the Mayflower; some came, of course, but it is appalling to think of what a fleet would have been necessary to bring over all that

**An address delivered before Philadelphia Construction Conference Group and Brick Manufacturers' Association.*

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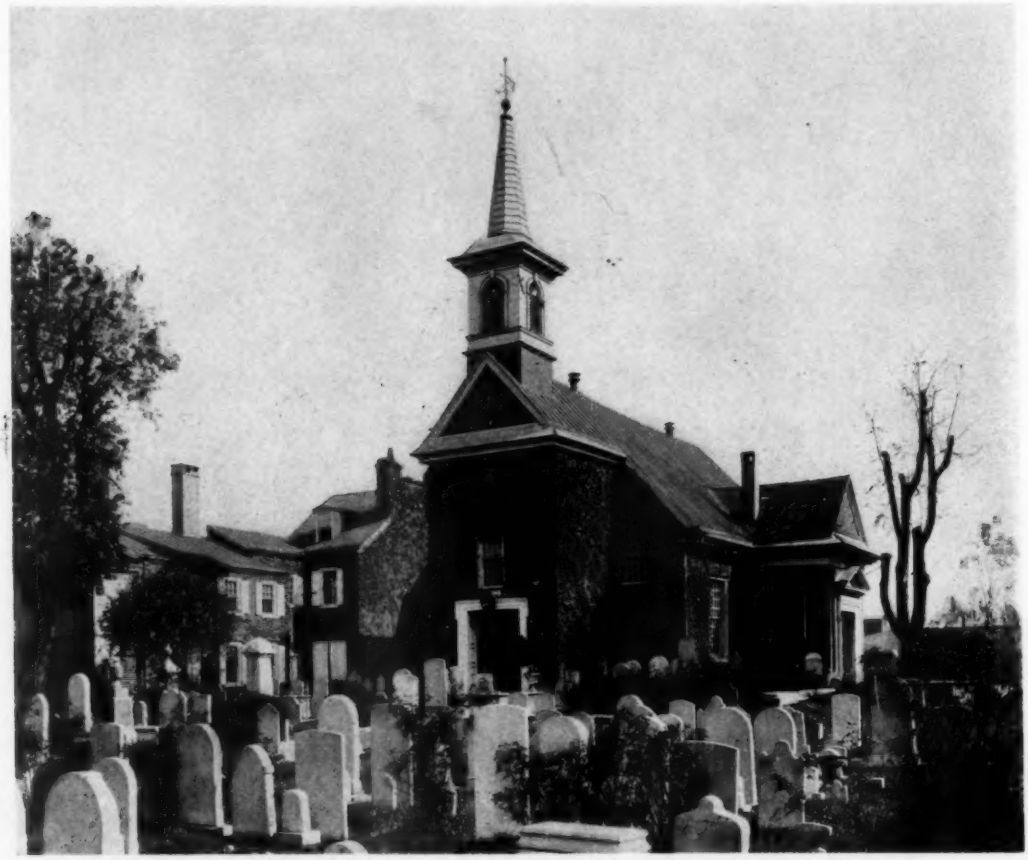
is said to have been imported, to say nothing of the expense. Ships were few and small and the demand for the very necessities of life was great. It is incredible, therefore, that any great quantity of brick could have been imported in those early days.

To test these oft-reiterated statements I have searched the early records and thought you might be interested to know just when bricks were first made in this country. The search has brought out many interesting facts and if our forefathers imported bricks from Europe up to the time of the Revolutionary War and after, as has been said, they were not the thrifty business men that we are accustomed to consider them.

The first brick kiln in New England was erected in Salem, Mass., in 1629. The minister at Salem during July of that year wrote "It is thought here is good clay to make Bricke and Tyles. At this instant we are setting up a brick kill to make bricke for the building of our houses."

Gawan Laurie of East New Jersey writes in 1684 "The poorer classes of houses are quite primitive in style, trees were split and set up with one end in the ground and the other nailed to the 'Rising.' They were covered with shingles and plastered within. Barns were built in the same way and the cost of these was about £5. Some used Pantiles in the Dutch manner. We have good brick earth and stone for building at Amboy and elsewhere. The country farm houses they build very cheaply, a carpenter with the Owner's own servants build the houses, they have all the material for nothing, save the nails."



"Gloria Dei"
Old Swedes Church, Philadelphia, Pa., Built 1698

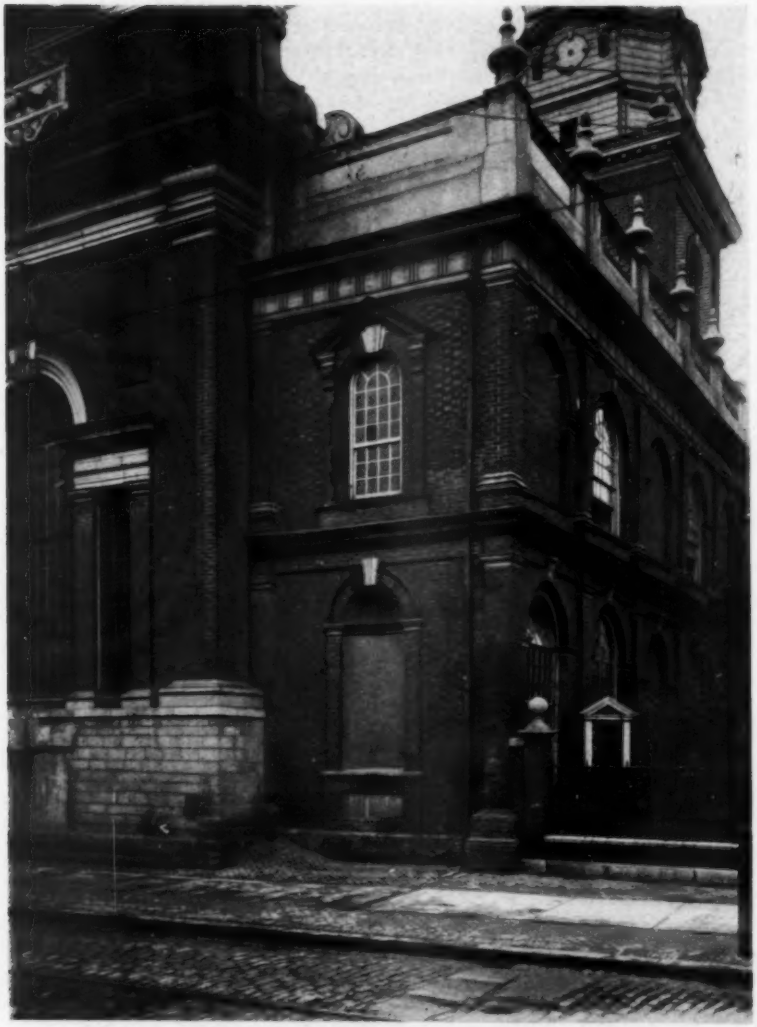
The first dwellings erected by the Swedes in Pennsylvania and Delaware were very crude and chiefly of wood, one story in height with a single room with a low entrance door and crude windows that were merely openings in the walls, later to be covered with oiled paper in lieu of glass. They were of the type common in Northern Europe for a century or two previous. On Timicum Island and Christiana Creek they built strong rude forts

of hemlock and hickory logs. They built a brick house at Wicaco in 1700 which still stands. Better dwellings were erected by their successors and neighbors, the Dutch, who brought bricks from New Netherlands for the purpose. At New Amstel (New Castle), Delaware, bricks were made in 1656. (Wm. Penn landed in New Castle, October 27th, 1682.)

Although the first English settlers in Pennsylvania were compelled to find lodging under the friendly trees and in caves or huts (John Key, the first child born of English parents in Philadelphia having been born in a cave in the bank near Race Street) they were shortly in possession of substantial brick houses. One writer states "Far out Market Street at Center Square embosomed in the Forest was erected in 1684 the First Friends' Meeting House, a large plain brick building." The present City Hall now stands on this site at the intersection of Broad and Market Streets.

William Penn's instruction to his agent in 1684 was to build principally of bricks "for

St. Peter's Church, Philadelphia, Built 1758-1761



Detail of brickwork, Christ Church, Philadelphia

which end I have sent a person qualified to make them."

Clay, sand and gravel were abundant within the city and fuel abounded on the banks of the Delaware and Schuylkill Rivers.

It is probable that some of the early houses, of which Philadelphia contained in 1684 over three hundred, were built of imported bricks, but Pastorius who founded Germantown in 1685 records that "they had a sufficient number of mills, brick-kilns, and tile ovens for all purposes." Four-fifths of the buildings in Philadelphia at the close of the Eighteenth Century were of brick and the city had at that early date a high reputation for the manufacturing of brick.

Christ Church on Second Street, south of Market Street, was built in 1727, but there was a church upon this site as early as 1695.

This church which was the most important church building in Philadelphia in the Colonial days is a splendid specimen of Colonial architecture and quite equal to any edifice that has been erected in Philadelphia up to the present day. Like all the important churches within the city this structure is substantially built of brick in the old manner that creates such a distinctive atmosphere of refinement and restraint. There has been much debate among antiquaries as to whether the brick was imported from England or not. There are records in the archives of the Parish showing that bricks were delivered by "sailing vessel" to Philadelphia for the structure erected in 1685, but whether the vessel came from England or from another of the Colonies, or possibly from New Castle on the Delaware only a few miles below Philadelphia where brick was made in 1656, is not stated. The 1727 structure was erected under the direction of Dr. John Kearsley and although no plans are now in existence, drawings were no doubt prepared by him. In 1746 a competition seemed to have been held in order to secure a design for the spire, (possibly the first architectural competition in America), in any event the Vestry decided in June 1746 that "in erecting the spire the draft which Mr. Harrison drew should be followed."

St. Peter's Church on Pine Street between Third and Fourth Streets was started in 1758. Dr. John Kearsley (the same who had in charge the building of Christ Church) and six others drew up a plan that was approved by the Vestry and the work was dedicated in 1761. Old St. Peter's with its grounds covering almost an entire city square, enclosed by a brick wall whose gateways have become a tradition in the architectural profession, stands as a monument to those sturdy straight thinking men to whose efforts we owe the "Red City" of Pennsylvania.

Gloria Dei commonly known as Old Swedes Church at Water and Christian Streets was erected in 1698. The selection of the site was

long delayed by a disagreement. One faction wanted it built at Passayunk (now Point Breeze) while others wanted it erected at Wicaco, about half a mile below what was then the southern boundary of the city. Finally at a congregational meeting on May 17, 1698, the matter was settled by writing the names of both places on separate pieces of paper and placing them in a hat. After tossing them around they were thrown upon the floor and the one bearing the word Wicaco landing face upward, the matter was settled.

This is the earliest brick church in Philadelphia and was built to replace the old block house built upon the site in 1665 in which the Swedes were accustomed to worship. Although smaller than Christ Church or St. Peter's it is a fine old example of Colonial architecture and quite Pre Georgian in its style.

The most important early brick structure in Philadelphia is Independence Hall well named the "Cradle of Liberty." The events which occurred within its walls have stirred the imagination of the world. The large central building of this group was designed by Andrew Hamilton, a lawyer; the land was purchased in 1730 and Andrew Hamilton, Dr. John Kearsley and Thomas Lawrence were appointed to supervise the construction of the building. Many delays occurred and in October 1736 when the Legislature sat in the east room on the first floor the windows were still unglazed. The tower was built in 1750, but the steeple was not erected until 1753.

Independence Hall has unfortunately undergone many changes and has been used for a variety of purposes. For a time it was rented to Charles Wilson Peale, the artist, and used by him as a museum. Later it was used by the City Councils.

The building was sadly neglected for many years and unfortunately when it was restored the Chamber in which the Declaration of Independence was signed was not restored to its original condition. The first floor of the building and the stair hall are pleasing in design, but it is nevertheless to be regretted that we are not able to visualize the interior of this historic building as it existed in 1776.

The westernmost building of the Independence Hall group known as "Congress Hall" was originally intended as the County Building. It was completed in 1789 and Congress first sat in it on December 6, 1790, when the National Capitol was removed from New York to Philadelphia. Congress occupied this building until May, 1800, when they moved to Washington, D. C. The building was restored by a Committee appointed by the Philadelphia Chapter A. I. A. in 1913 and has since been used as a permanent museum for the

Detail of lower portion of tower of Independence Hall, Philadelphia

exhibition of antiquities of the Colonial Period.

The old Jail was located at Sixth and Walnut Streets, just in back of Congress Hall and convict labor was used in constructing the latter building. From the quaintly worded records we learn that human nature has not changed much since the early days, for the convict laborers were in the habit of lifting the iron ball and chain by which they were shackled and dropping same into the mud on the passing of some of the silk-stockinged gentry out on promenade, which fact seriously disturbed the city fathers and brought many threats of suit for damages.

Congress Hall, Philadelphia, Built in 1789. Congress sat in this building from 1790 to 1800. George Washington was here inaugurated for his second term

At the eastern end of the group is the First City Hall, possessed by Philadelphia; it was built in 1790. Although originally intended for city offices, it was necessary to tender a portion of it to the United States Supreme Court, when the Federal Government was moved to Philadelphia in 1790. The Supreme Court held its first session in the building on February 7, 1791. The Supreme Court of the State of Pennsylvania also sat in the building and subsequently it was occupied by the City Councils.

When we read in the early history of the Colonies that smoking was prohibited within the city limits in certain provinces and travellers were prohibited from smoking but once in a ten mile journey in others, we are inclined to attribute puritanic instincts to our staid and sober forebears but certainly they did not taboo the lottery, for the records show that a lottery was instituted to further the erection of this "Towne Hall" in Philadelphia with $50,000.00 as the aggregate, 20 per cent. of which was to go to the fortunate winner.

At the rear of this interesting group was the "State House Yard" or the "Mall" as it was sometimes called. This contained a serpentine walk and it was the custom of the élite to promenade thereon upon pleasant afternoons as a mode of recreation. The "Mall" was surrounded by a brick wall with piers at regular intervals, the entire height of which was about 8 feet. The city fathers became apprehensive that the air in the "State House Yard" was not conducive to the public health and after deep deliberation it was deemed desirable to remove the brick wall between the piers and to replace the same with "iron palisades in order that the atmosphere might be made the more salubrious." It is to be hoped that the treatment was efficacious.

Steadfast and true to every belief that they held, these sturdy pioneers of the young Republic have left us monuments of government and of art which we of a more hectic generation may well strive with like singleness of purpose to emulate.

Up until 1829 all the bricks used in this country were made by hand, but during that year the manufacturing of brick by machinery was successfully started. In New York the machinery then used made twenty-five thousand bricks per day and

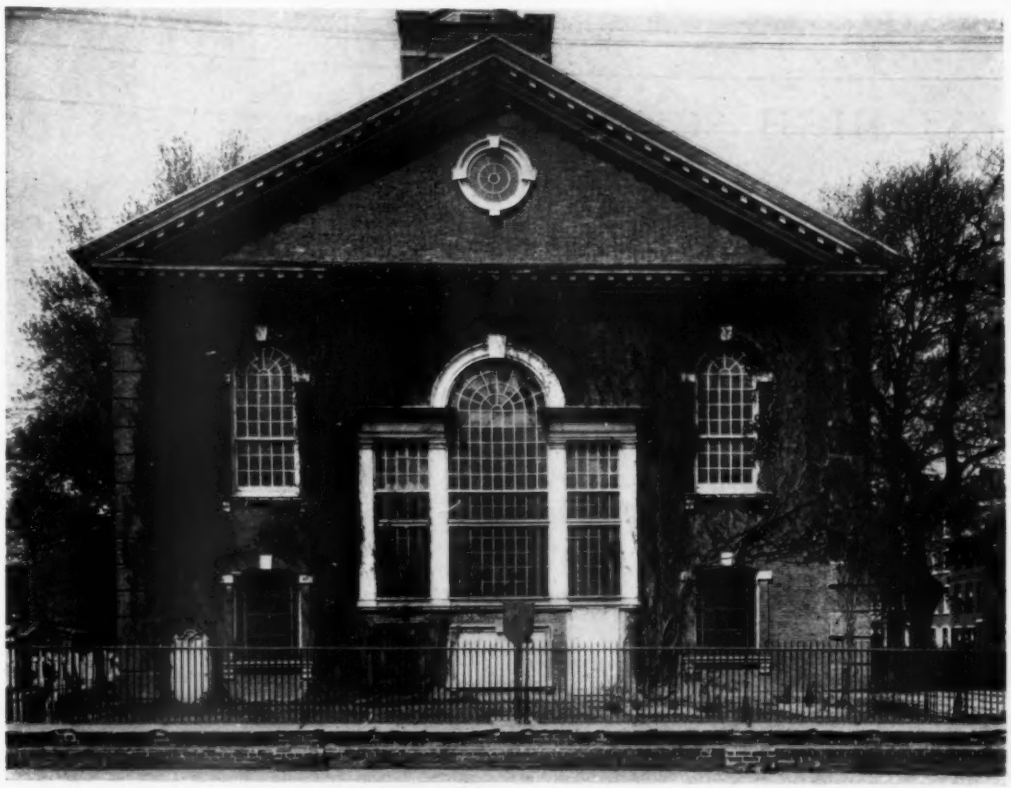
Christ Church, Philadelphia, Built 1727. Over the Palladian window on the front, there still remains the bust of George III

they were sold for Five Dollars ($5.00) a thousand. The Salamanda Fire Brick Works at Albany, New York, was established that year and was so successful as to stop the importation of fire bricks.

So closely is the making of brick interwoven with the march of human progress that one must go back to the dawn of history to learn of the beginning of the industry. The earliest evidences we have of recorded history are a few manuscripts and inscriptions found in Egypt, dating back about three or four thousand years B. C. Those of Babylonia are scarcely less ancient. Both of these countries owe their prosperity to great rivers which inundated the land enriching it for agricultural pursuits and furnishing also great deposits of clay from which the natives built houses, first of adobe and then of brick. Israel labored long in Egypt as brick makers as Scripture records. Babylonia, situated as it was between the Tigris and the Euphrates Rivers in the valley called Mesopotamia (The land between the rivers) possessed no forests although the date palm was abundant and with little stone, they early resorted to the expedient of moulding the clay into bricks, which were dried in the sun and from these they built their cities.

Of all the early Babylonian kings the most famous was Hammurabi, who ruled about 2000 B. C. He it was who formulated the oldest code of laws of which we have any record, but long before man achieved a legal code he made bricks and from the characters imprinted upon these bricks, marking the dynasty under which they were made, many important dates in history have been verified.

Noble indeed has been the art of brick making and human progress owes much to this industry.



East End, St. Peter's Church, Philadelphia

The Bridge Approach to the Forecourt

EAST HIGH SCHOOL, CINCINNATI, OHIO

GARBER & WOODWARD, Architects

THE following communication, received from Messrs. Garber & Woodward, Architects, and printed by their permission, valuably supplements the illustration of this interesting high school group.
EDITORS.

THE educational problem to be solved in this school was not a light one and is of primary importance as the program is to any competition. We had in this problem, however, not only a definite object to accomplish but the hearty co-operation of the Superintendent and a small Board that were eager to get all they could out of the solution of the problem.

A word as to the site: The site selected by the Board of Education consists of 38 acres, an old farm, located on the edge of one of our best residence districts. It also draws from a remoter district children from a factory colony. These conditions called for a school to house all the activities that could be required in a high school. As Dr. Condon, the Superintendent, expressed it in words that are now carved on the base of the tower:

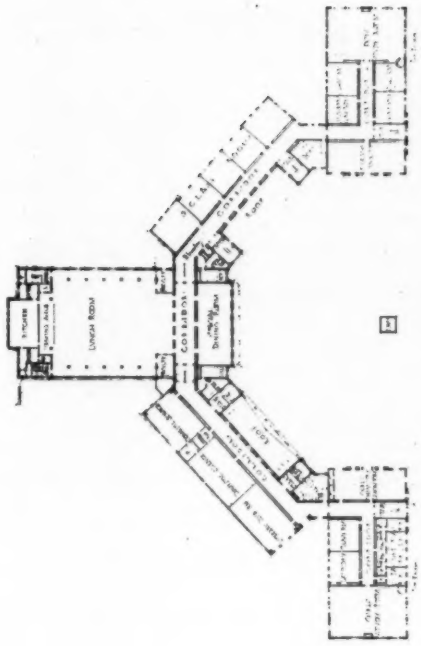
"All who will may enter and find within these walls equal and varied opportunity for a liberal education, based alike upon art and industry, with books and things, work and study combined; and where good health, the spirit of play, and joy in work well done shall abound."

Some of the restrictions were of great importance. First, the lot faced a very important thoroughfare. Second, the axis of another equally important thoroughfare terminated in whatever would become the forecourt of a group of buildings or the principal feature of the exterior of the building. Third, the extreme variation in the grades of the lot was 60 feet.

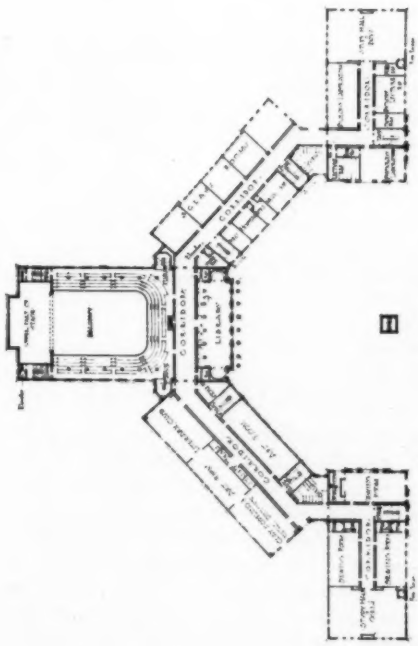
The lot seemed impossible, except at great expense, to house all departments in one building. The fine wooded valley running parallel with the street we considered should be preserved. We were of the opinion that with the lot restrictions, it would be best not to house all the departments in one building but to arrange them in a group of buildings. All preceding high schools in Cincinnati were housed under one roof.

The chief objection to a group plan was the time that would be lost in moving classes between periods. This objection was answered, as it was believed, and has since proved a fact, that a few minutes so lost would be more than made up by the efficiency of the pupils in the class room; the advantages of outlook and the fenestration also were not to be ignored. The orientation is such that the sun is present some time each day in each room.

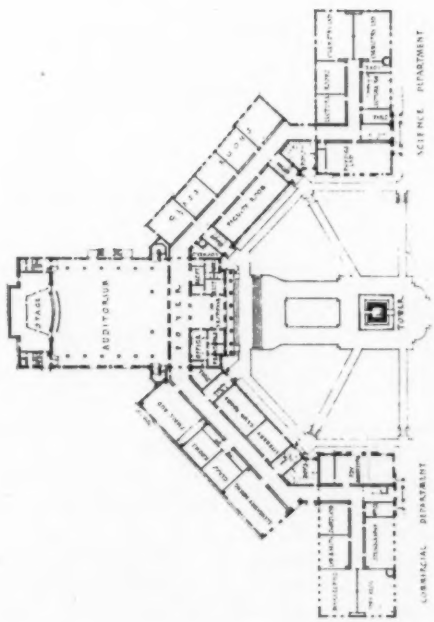
The departments at this time were located and the development of the plan began. The departments as located were as follows: The central



THIRD FLOOR PLAN



SECOND FLOOR PLAN

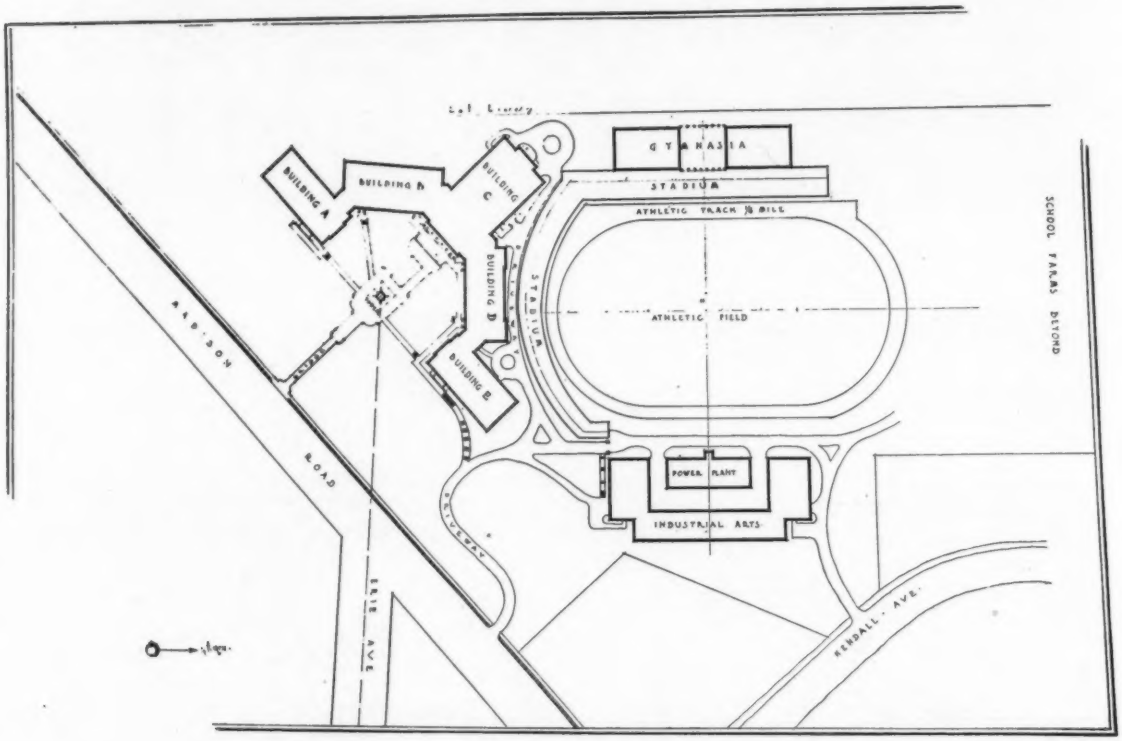


FIRST FLOOR PLAN

ACADEMIC GROUP
EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS

building houses on the first floor the administrative office and auditorium. The second floor, the balcony of the auditorium and the library. On the third floor the lunch rooms. Grouped about this center, beginning with building "A," extreme left, the commercial department is housed on the first floor with one of its rooms in building "B" in the rear. Continuing along the rear there are two class rooms and a small auditorium. The rooms facing the forecourt are literary club rooms which are used for club purposes, teachers' meetings, etc., and for recitations in literature. The building "C." Building "D" is devoted entirely to class rooms, faculty rooms and emergency room. The class rooms were not all located in building "D" but some were located in each building except building "C." This permitted of a little more elasticity and reduced the moving of classes from building to building. They were also placed in this building because of their central location and particularly for their proximity to the industrial arts building and the gymnasia. Building "E" is devoted entirely to the sciences and their lecture rooms and several class rooms, and on the



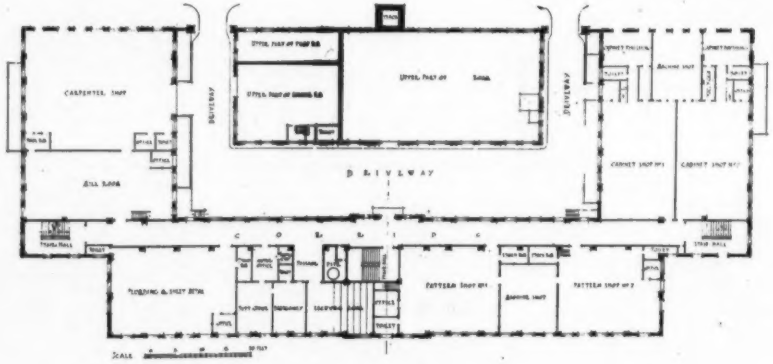
GROUP PLAN

EAST HIGH SCHOOL, CINCINNATI, O.

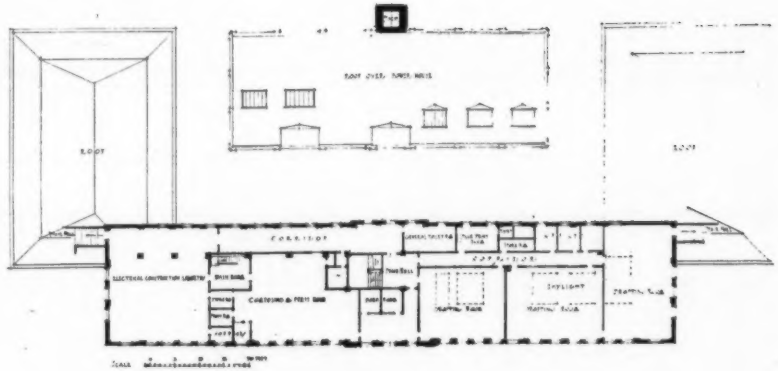
GARBER & WOODWARD, ARCHITECTS

second floor of building "A" is occupied by a large study hall and sewing rooms. On the second floor of building "B" are housed the arts and crafts with a large class room. It will be seen that the art rooms are on the same floor and adjacent to the library in building "C." The third floor of building "A" is occupied by a model flat, girls' study room, class room and laundry and a girls' chemistry laboratory and on the same level in building "B" domestic science rooms. The girls' chemistry laboratory, which is devoted to the chemistry of cooking, is adjacent to the domestic science rooms located on this same floor in building "B" and the lunch room on the same floor in upper two floors in a corresponding position, as in building "A" are the boys' study rooms.

In the program for the gymnasia and the stadium, which might be considered as a part of it, all physical activities of the school are housed and provisions are made for visiting teams and for all the activities of the stadium. This is the only stadium in the city available for all the high schools. On the first floor, which rises above the concourse level to the left, are located the plunge, shower and dressing rooms and immediately above it the gymnasium for the girls. To the right, the same provisions are made for the boys. As the land slopes toward this end of the building, pro-



SECOND FLOOR PLAN



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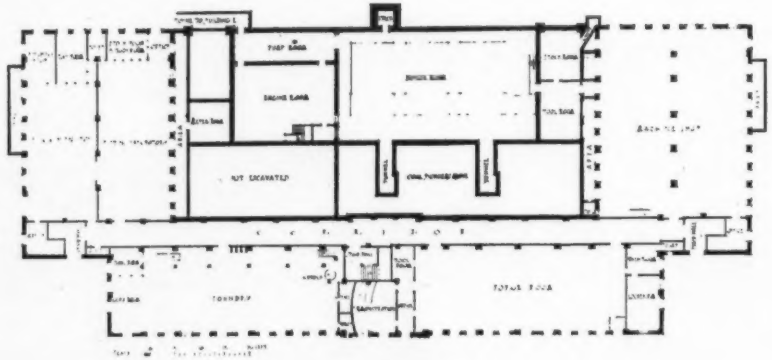
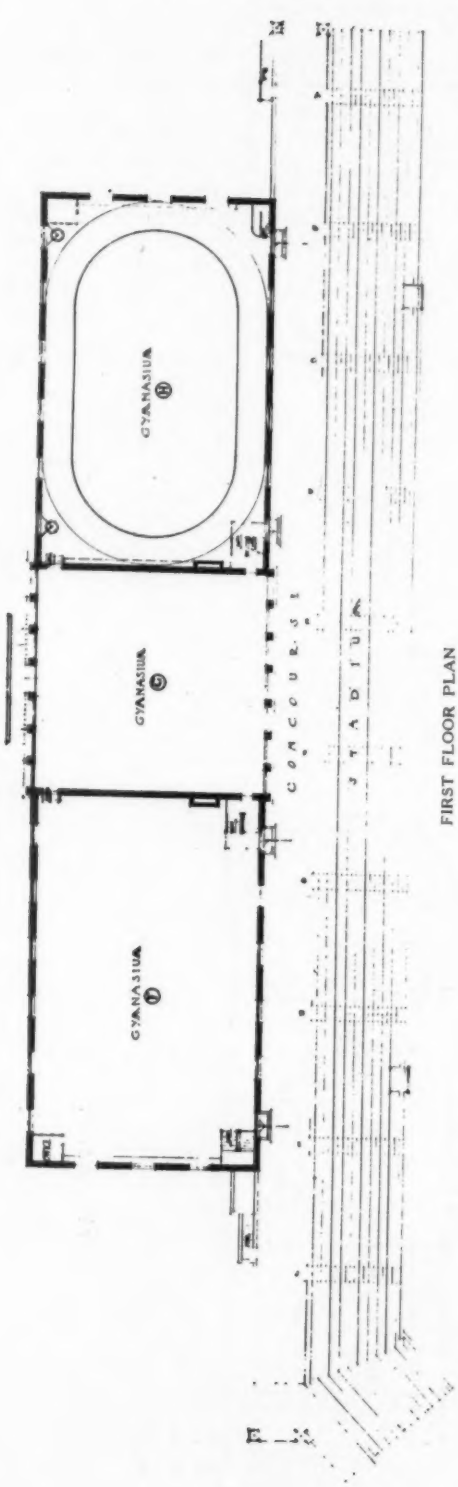


FIRST FLOOR PLAN

INDUSTRIAL ARTS BUILDING AND POWER PLANT
EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS



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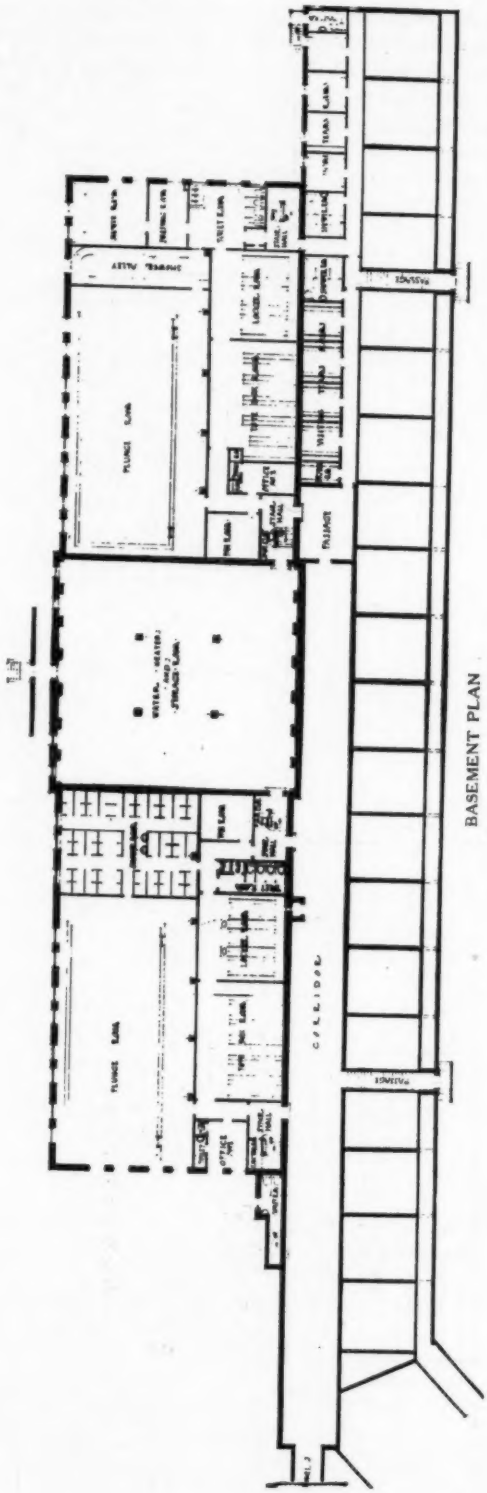


BASEMENT PLAN

GYMNASIUM AND STADIUM
EAST HIGH SCHOOL, CINCINNATI, O.
GARBER & WOODWARD, ARCHITECTS

visions were made for a laundry where in time it is hoped to have the necessary machinery installed. Between these two gymnasia is located the open air gymnasium. The open air gymnasium can be used by either boys or girls and the walls are prepared for hand ball and basket ball. This gymnasium is used only when the weather will not permit the use of the field for gymnastic exercises. By the use of team rooms, visiting pupils are excluded from all the gymnasia.

In the industrial arts, all departments of industrial work were to be housed. Grouped with the industrial arts buildings are the heating facilities for the entire group of buildings. This building although externally conforming to the design of the buildings for the gymnasia and the academic group is on the interior, finished as a factory. The building is extremely compact and the corridor space, which runs the full length of the building, is divided into two stores for each shop height to provide the necessary locker space. In this building are housed on the first floor automobile construction shop, testing laboratory, foundry, forge and machine shops; second floor, carpenter shop, mill room, plumbing and sheet metal, pattern and cabinet shops; on the third floor, electric construction laboratory, composing press room and drafting rooms.

A word as to special features: In laying out the preliminary sketches, the architects found that the number of pupils per class varied with each department. In the interest of economy in construction and teaching, insofar as possible, a unit of thirty pupils was fixed for all classes. This is an innovation and each class accommodates thirty or multiples of thirty. In other words, the gymnasia classes were fixed at sixty, two units, with provision for ninety if needed. The science, commercial, industrial and household arts were fixed at one unit or a multiple thereof. A small auditorium was provided to take five units. This is used for special group instruction for science classes, music, special lectures in which lantern slides and moving pictures are used. The study rooms, four in number, were fixed at eight units each. The total capacity of the school was figured at 1,800. This provides for one-half the pupils on this basis to make their home rooms, as they may be called for want of a better name, in the study rooms. With thirty class rooms the total number of pupils is made up. Each pupil is provided with a locker in the corridors, which distributes the pupils over the entire building. The lockers take up all the space between double walls not used by columns, heat ducts, and other utilities. What the total capacity of the school would be if all departments were working to their full quota of thirty, we are not prepared to say as that would be a matter of program. But this we do know, that this year there are 400 more pupils than the school was designed for and as yet no interference with the functioning of the school has been noted.

In lieu of home rooms for the teachers, there is a faculty room. In this room provisions are made so that a number of instructors can use it as their headquarters when not teaching. This applies primarily to the teachers who do class room work only. The departments in science and the commercial arts have provisions made for offices for their instructors' use and there is no difficulty in the arts department of having the teachers use their rooms as home rooms. There is no reason, however, why the class rooms should not be used every hour of the day and they will be when the school becomes crowded. It is false economy to permit a room to be used for instructions for two periods a day, say in Latin, and used for no other purpose during the remainder of the day. Such a teacher would be assigned to a class as a pupil and her remaining time, if not utilized in class work, would be employed in the faculty room. The use of the faculty room and the provision made for doubling up certain units have added an elasticity which we have not found in our other high schools.

The auditorium is a part of the academic group and has a seating capacity equal to the capacity of the school, with ample stage facilities. Through the generosity of Mr. R. K. LeBlond, a citizen of the community served by this school, a large Skinner pipe organ was installed behind a neatly designed screen at the rear of the stage, the manual of which was placed on the main floor near the orchestra pit.

As to the exterior: The buildings are approached from either end through the valley and on the main axis by the bridge. The bridge became necessary as we retained the beautiful wooded valley between the street and buildings. The drive follows the rear of the academic group. The forecourt is approached across the bridge on the axis of the tower. The tower not only marks the axis on Madison Road, which it faces, but also terminates the end of Erie Avenue and can be seen for at least a mile and a quarter.

The cupolas on the buildings and the chimneys are for discharging foul air.

The gymnasia and the industrial arts face the long side of the athletic field and are at right angles to the axis of building "D."

Beyond the athletic field when the demand is created and funds are available, the Board expects to develop an agricultural school.

The buildings are all fireproof cage construction of concrete. There are no particular structural features of note.

XUM

GENERAL DAVID McMURTRIE GREGG
HEROIC STATUE ERECTED IN READING, PA.
AUGUSTUS LUKEMAN, SCULPTOR

FRANCIS ASBURY
AN HEROIC STATUE TO BE ERECTED IN WASHINGTON, D. C.
AUGUSTUS LUKEMAN, SCULPTOR

XUM

EAST HIGH SCHOOL, CINCINNATI, O., GARBER & WOODWARD, ARCHITECTS

(For complete description and floor plans see pages 340 to 345, both inclusive)

VIEW OF TOWER AND RIGHT FORECOURT, BUILDINGS D AND F

EAST HIGH SCHOOL, CINCINNATI, O.

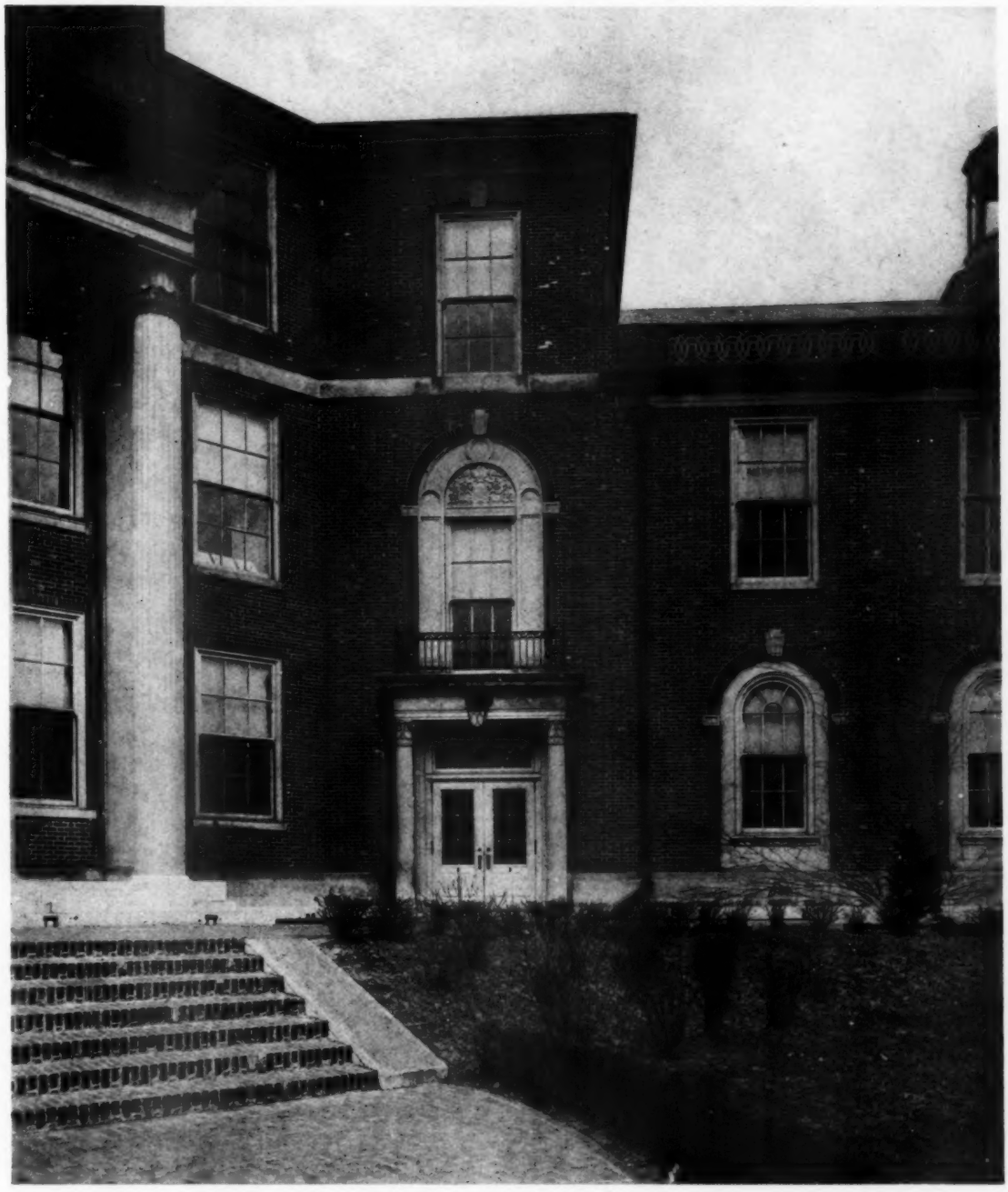
GARBER & WOODWARD, ARCHITECTS

ELEVATION BUILDING B, ACADEMIC GROUP. MAIN ENTRANCE AT RIGHT

EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS

XUM



DETAIL OF BUILDING D

EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS

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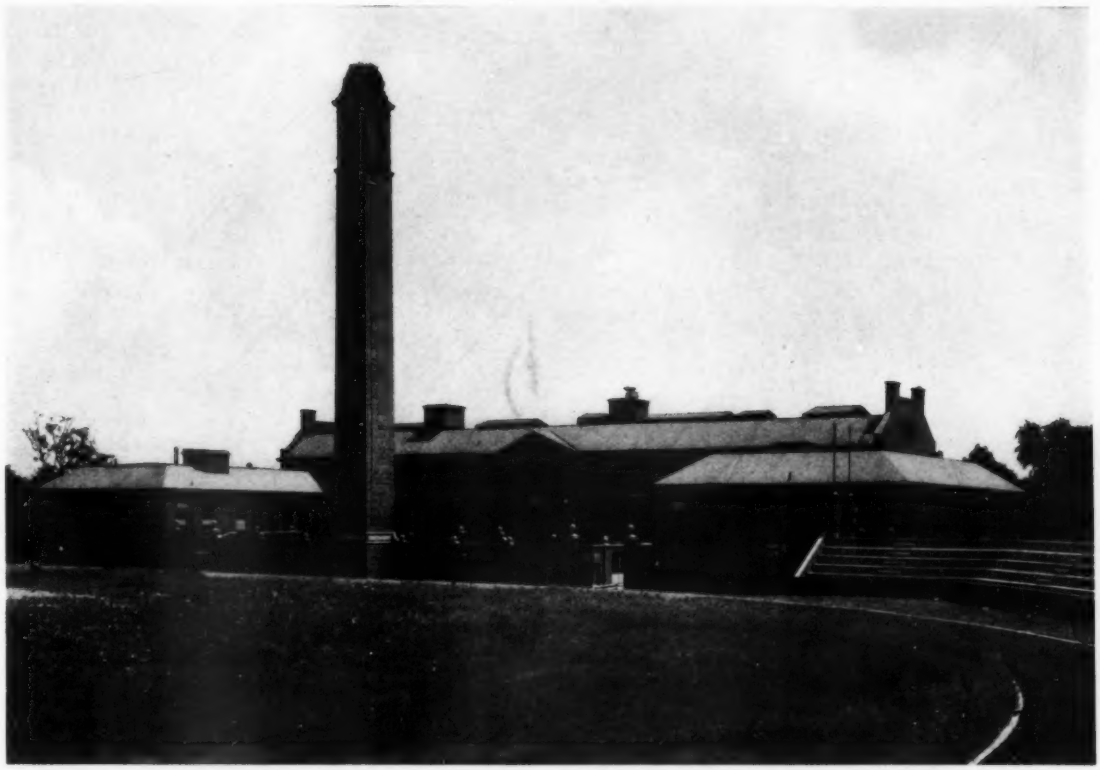
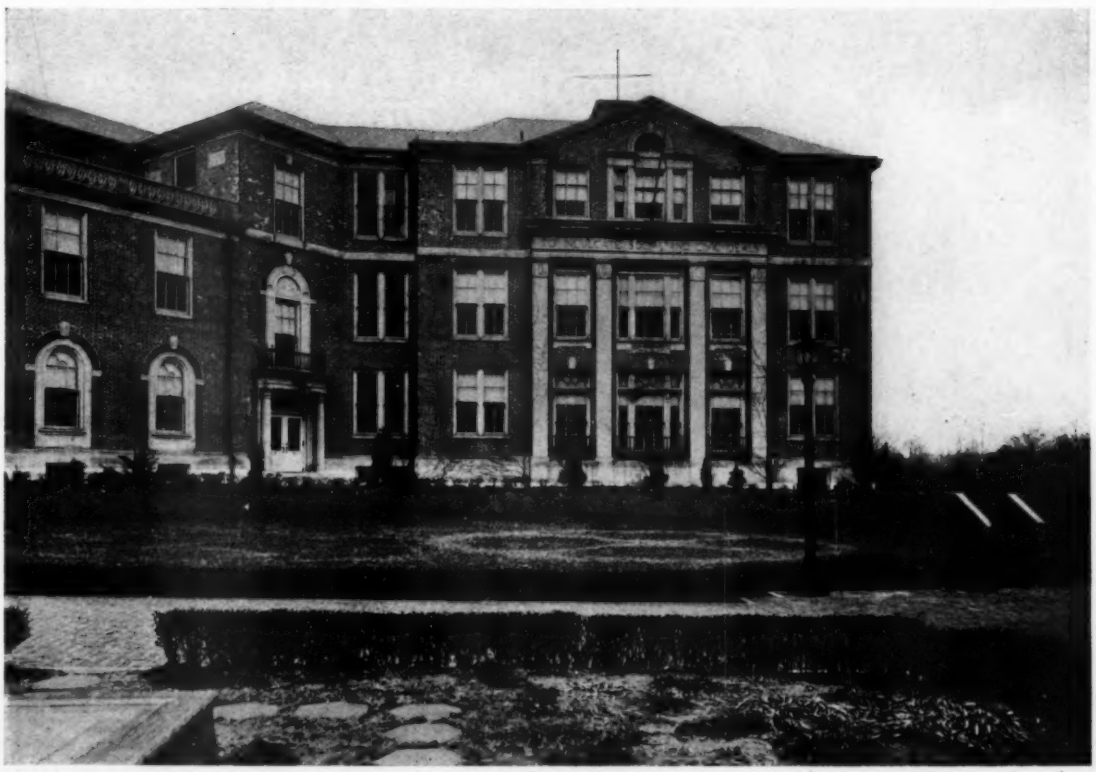


POWER PLANT AND INDUSTRIAL BUILDING, FROM ATHLETIC FIELD



BUILDING E, FROM FORECOURT

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GARBER & WOODWARD, ARCHITECTS

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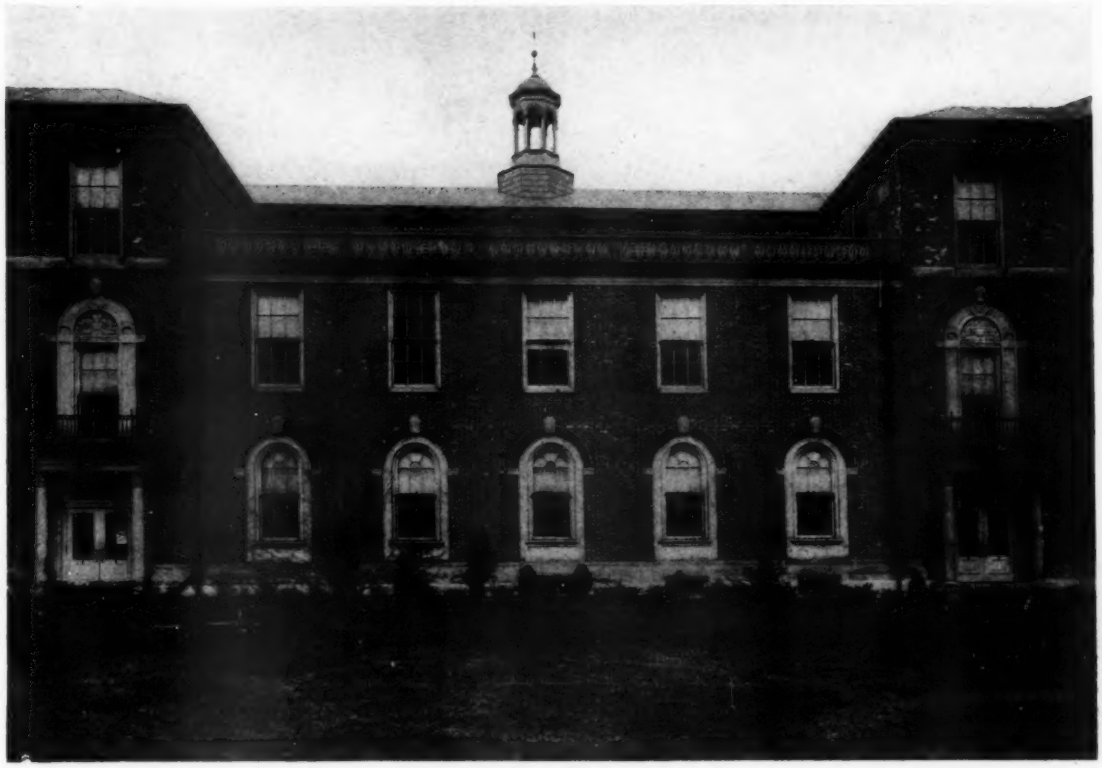
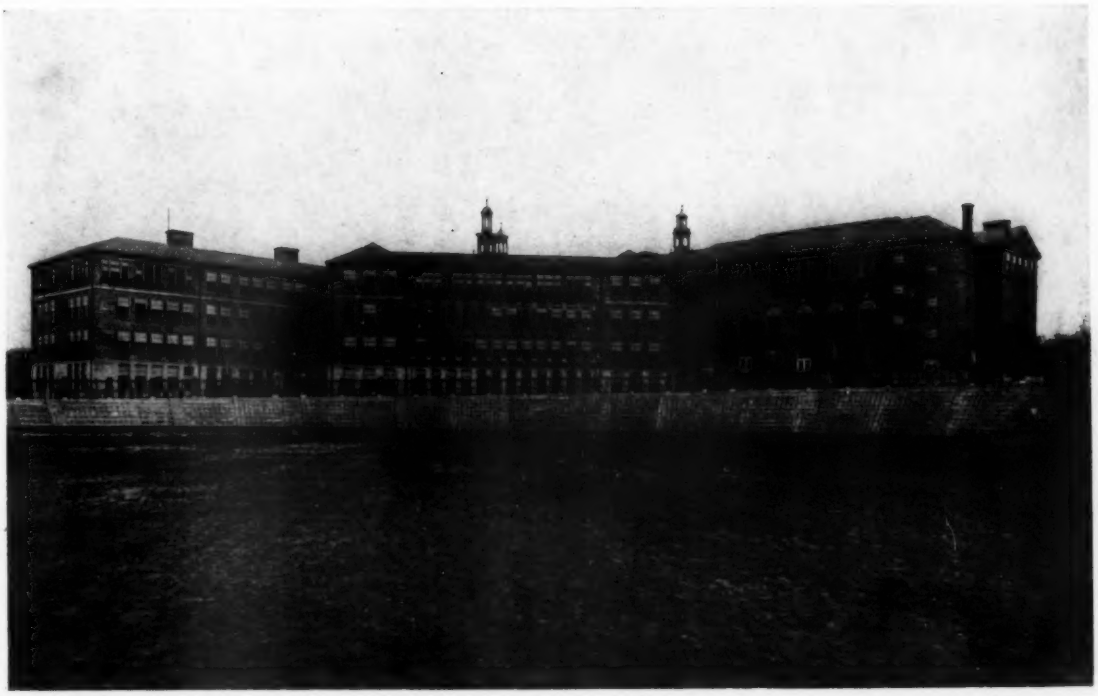


ELEVATION OF BUILDING D



REAR VIEW, ACADEMIC GROUP, FROM ATHLETIC FIELD

EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS

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AUDITORIUM

EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS

MAIN ENTRANCE LOBBY

VIEW IN LIBRARY

EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS

DOMESTIC SCIENCE ROOM

LUNCH ROOM, ACADEMIC GROUP

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GARBER & WOODWARD, ARCHITECTS

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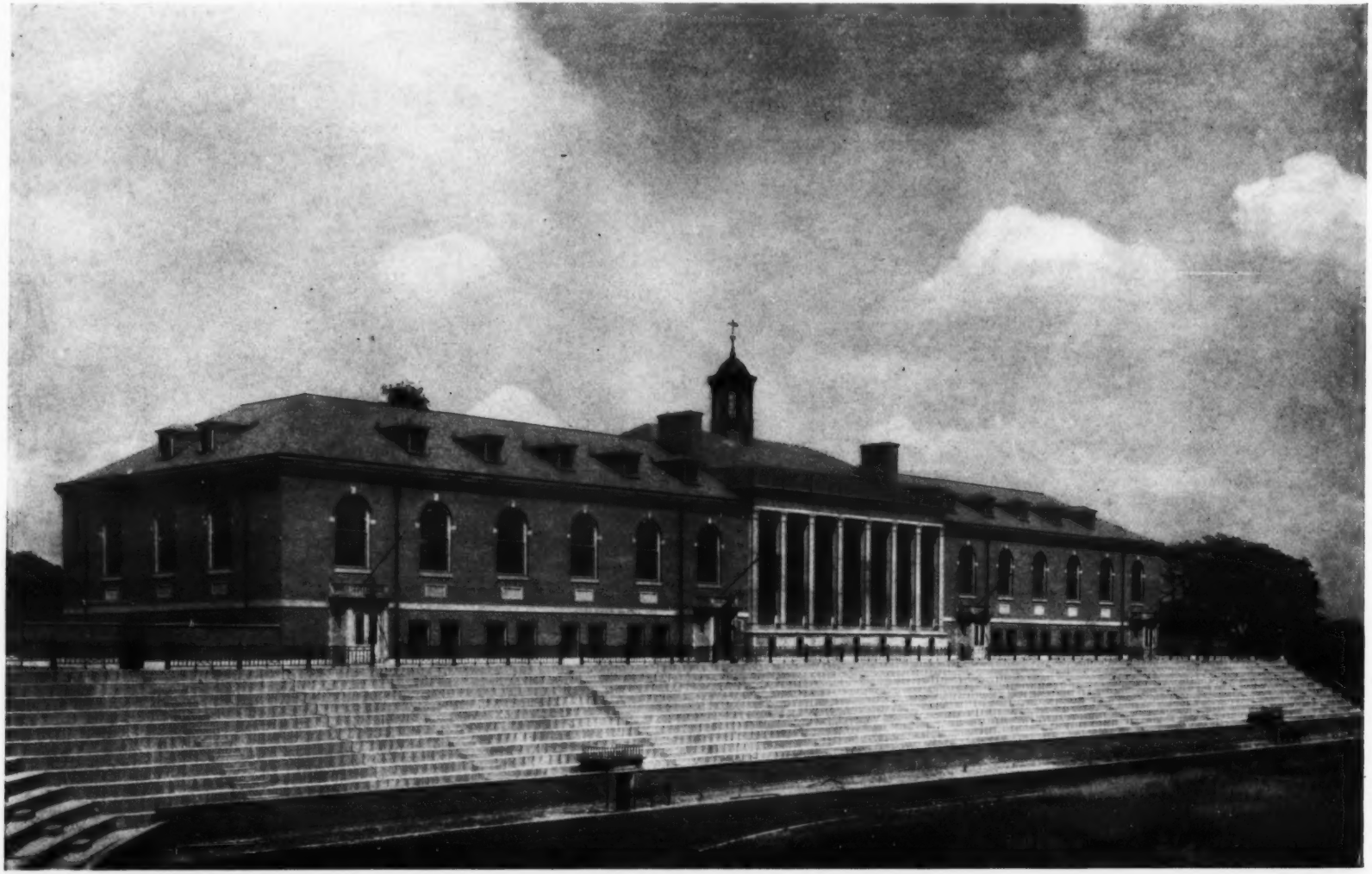

GYMNASIUM, FROM ATHLETIC FIELD

EAST HIGH SCHOOL, CINCINNATI, O.

GARBER & WOODWARD, ARCHITECTS

VOL. CXXI, NO. 2392 APRIL 26, 1922

BUILDING FOR HUMBLE OIL & REFINING CO., HOUSTON, TEXAS

CLINTON & RUSSELL, ARCHITECTS

(See page 355 for floor plans)

DETAIL OF MAIN ENTRANCE

BUILDING FOR HUMBLE OIL & REFINING CO., HOUSTON, TEXAS

CLINTON & RUSSELL, ARCHITECTS

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THE BOARD ROOM

BUILDING FOR HUMBLE OIL & REFINING CO., HOUSTON, TEXAS

CLINTON & RUSSELL, ARCHITECTS

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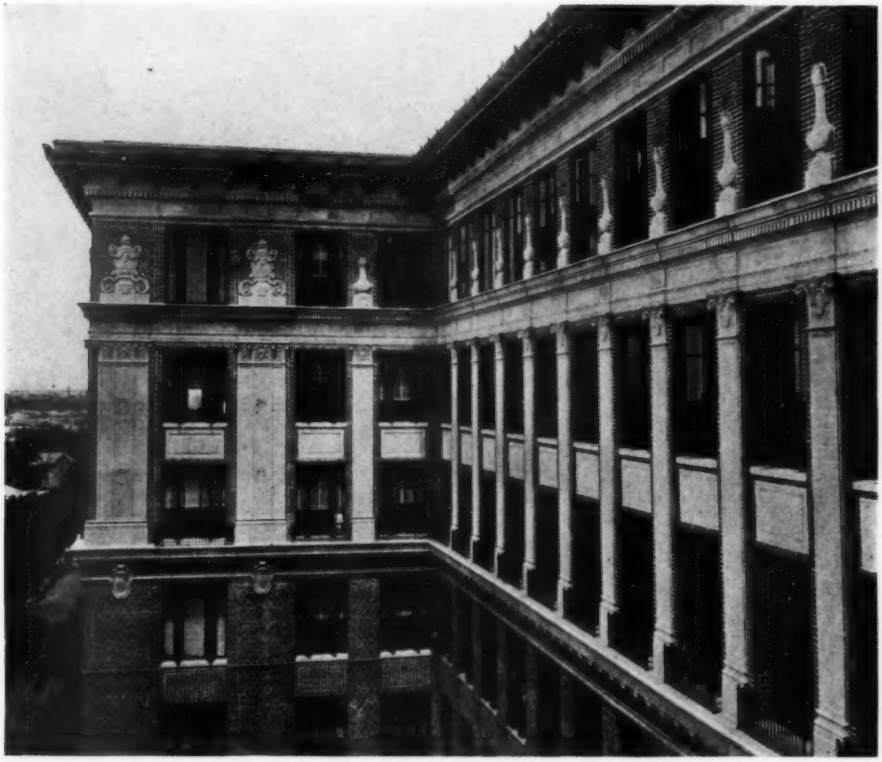

DETAILS OF UPPER AND LOWER STORIES, POLK AVENUE ELEVATION

BUILDING FOR HUMBLE OIL & REFINING CO., HOUSTON, TEXAS

CLINTON & RUSSELL, ARCHITECTS

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STORE FRONTS ON MAIN STREET

REAR ELEVATION

BUILDING FOR HUMBLE OIL & REFINING CO., HOUSTON, TEXAS

CLINTON & RUSSELL, ARCHITECTS

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ABOVE: TYPICAL CORRIDOR. AT LEFT: DETAIL OF MANTEL IN BOARD ROOM

BUILDING FOR HUMBLE OIL & REFINING CO., HOUSTON, TEXAS

CLINTON & RUSSELL, ARCHITECTS

·EDITORIAL·COMMENT·

OF THE EIGHT HOUSING bills, presented by the Lockwood Committee and passed by the New York State Legislature, Governor Miller has signed seven. Of these, the one as more largely affecting housing conditions in New York State is that which enables insurance companies to invest up to ten per cent. of their assets in apartment houses where the monthly rental shall not exceed nine dollars per room. One of the largest insurance companies has already promised to set apart $100,000,000 to this purpose. This bill is but a temporary measure and can only be justified as such. It was framed and its passage urged as affording the only practical means of relieving a shortage in certain types of dwellings, which has become acute. The duration of the powers granted is limited to March 1, 1924, unless the Legislature shall further extend the emergency laws. With the passage of this law and the quick action promised by the insurance company, it is believed the crisis in housing will soon have passed its worst stage.

The present successful legislation is the culmination of two years' arduous work on the part of the Lockwood Committee. A condition that seriously affected the economic welfare of this state existed. The Lockwood Committee has, as the result of its long labors, secured the passage of a group of enactments, that, while not a panacea for all our building and housing ills, are a long step in the direction of the abatement of conditions that had become intolerable.

The bills signed by Governor Miller, in addition to the one already referred to, provide:

That the emergency rent laws shall be in force to March 1, 1924, unless further extended by the Legislature.

That tenants shall be further protected by new sections of the law from the rapacity of gouging landlords.

That fire insurance rate making monopolies shall cease and that all rate making bodies shall be subject to the supervision of Superintendent of Insurance.

That mutual fire insurance companies shall not convert themselves into stock companies.

That mutual insurance companies may write the same line of policies as stock companies.

That New York City may hold principal contractors to perform work abandoned by sub-contractors.

The present outlook in New York State is now encouraging. Capital having signified a willingness to do its part to the fullest extent, all that remains is for labor and all and sundry who engage in building operations, to show an equally liberal spirit of co-operation.

* * *

REFERRING IN A RECENT issue to the work of The Architectural League of New York, in the development of a higher grade of craftsmanship in this country, as shown in the exhibitions of that efficiently working organization, the necessity for similar well sustained effort all over the United States was emphasized.

Just now when there is strong indication that we are entering on the most important building era this country has ever experienced, the shortage of skilled labor is everywhere apparent.

Organized architecture may indulge in no more useful work than in the effort to overcome these conditions, and by well directed measures secure co-operation on the part of organized labor that will result in a better educated and more technically skillful type of craftsman. Until this is done architects will be sadly hampered in securing a satisfactory completion of even the simplest design. Now they hesitate to give full swing to their artistic faculties in design, despairing of their proper execution.

Several years ago, a report was presented to the Institute at one of its conventions, on the development of craftsmanship. Ralph Adams Cram was the chairman of the committee, and in the course of the reading of this report, Mr. Cram stated that the craftsman was "the architect's *alter ego.*"

This very true acknowledgment of the proper relationship of craftsmanship and architecture left with us an impression that the years have not effaced. Like many another of the splendid reports of various committees, it received its polite ripple of applause, the stamp of approval, and there it apparently ended. There are hundreds of matters that have consumed the time of conventions since then of far less real importance than this matter of craftsmanship.

As our building activities increase and the scarcity of skilled labor becomes more apparent, the need for some systematic control of the methods of recruiting the ranks of our craftsmen will become insistent.

Why not omit many of the useless, time-wasting debates; why not omit politics and personal preferment and take up a small group of practical, vital things and give them the strongest support? Craftsmanship and its best development are the crying needs in the development of good architectural design; it is the vital thing in good building. No one can successfully dispute it. It is a fact. The most thoughtful men in the profession have at one time or another substantially made such a statement.

The Architectural League of New York has for a number of years given much of the time of its well organized committees to efforts to develop good craftsmanship. In its various exhibitions, it has been able to show in the finest way the splendid results it has accomplished in the sphere of its in-

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fluence. But this fine example needs to be followed by organizations in every state. And that would be a great effort for State Societies. In fact, the more that these and other equally important and much needed reforms are considered, the more logical it seems to be to contend that what is needed is more State Societies.

Detroit, as pointed out in a recent issue, is following the excellent example set by Philadelphia, and holding classes, looking to the higher education of all the many craftsmen engaged in building operations. Apparently the machinery of the Institute is too cumbersome, or too overloaded with matters more nearly allied to the theory of practice to be able to give this important matter the attention it deserves.

* * *

ANOTHER MATTER THAT might be efficiently furthered by activities of State Societies is that of Basic Building Codes. The insistencies of codes and also their inconsistencies have in one way or another a harmful effect on building resumption.

Some three years ago, a Committee on Basic Building Codes of the Institute practically threw up the sponge and acknowledged itself at a loss to suggest any practical manner for proceeding to a standardization of building requirements as relating to codes.

Mr. Hoover's Department in Washington has through specially appointed committees been trying to get this matter of a basic code on the road to solution. Progress is reported but results are not yet practically in sight. We are too large a country and the matter of codes is too cumbersome a problem to hope for much progress, particularly if progress is to mean a solution that will apply to the entire country. But, if there were well organized State Societies in every state, working in co-operation with local state organizations, such, for example, as The Architectural League of New York, there would come order out of the present chaos, and we might be able to detect a measure of progress.

* * *

"HELL," IT IS SAID, "is paved with good intentions." It must be acknowledged that the intentions of the Institute, as set forth in its various committee reports are always good. What is lacking is a measure of performance. Nor is this lack of performance entirely the fault of the Institute as at present organized, but it is mainly due to its failure to carry its organization to the same executive completion that other organizations, representing less important industries, are conducted.

What any body, seeking to represent an industry as large and important as architecture, requires is an executive head and well developed working force to take up the matters brought before conventions and approved, and carry them to the utmost possible conclusion. When such an executive department is organized, much of the present criticism of the Institute will cease. With an efficient executive head, The American Institute of Architects would be as constantly in the public eye as is now any one of the well organized representative bodies of other professions and industries.

Then, the calumnies on the profession that are ignored, the influence of the Institute in every public problem that might rightfully concern it, would be treated in the proper way.

Then would architects resume their proper position as the master builders. Then would the general public learn that architecture was something more than the production of drawings of design and plan. It would be known that architects, while first of all artists, must also be efficient and thoroughly practical executives.

* * *

ARCHITECTS WHO WOULD keep abreast with present conditions as to adequacy of wiring, should learn just what those conditions are, impress them on their clients and urge the importance of adequate wiring. Not so many years ago, the lighting load alone was considered and many present wiring codes are based on old practice.

As an instance of new conditions arising from the introduction by tenants of many electrical accessories, a recent survey of a modern apartment house is a case in point. Of the larger utilities, such as portable vacuum cleaners, electrical stoves and flat irons, there was a total of 157, and in addition to this, each family had installed the many different varieties of dining table and toilet electrical appliances.

In the bill rendered for electrical current, the appliance load was 37.2 per cent., the power load 34.4 per cent. and the lighting load only 28.4 per cent. of the total. As will be seen, the lighting load was but a small fraction in excess of one-quarter of the total, while the appliance load was almost two-fifths of the entire load.

TWO COLUMNS FROM LA DAURADE*

SOME columns and a handful of mosaic cubes are all that remain of the ancient church of Notre-Dame La Daurade at Toulouse, one of the earliest Christian churches in Gaul and certainly the most magnificent church north of the Alps before the time of Charlemagne.

This venerable monument was destroyed in 1764 to make way for the present structure, built from the designs of the architect Hardy, which stands on the site of the old church. Fortunately, however, we have a description of the splendid mosaics which were the chief glory of the church, in a manuscript written by Dom Lamothe† in 1633, before the destruction of the primitive edifice. Another Benedictine, Dom Martin, in his work on the religion of the Gauls, published in 1727, devotes a chapter to Notre-Dame La Daurade and gives a wretched engraving showing a ground plan of the church as it was in his day, a conjectural plan of the original church, and a sectional view of the interior of the sanctuary. Although, unhappily, there are discrepancies between Dom Martin's text and his illustrations, nevertheless, it is possible, from these and from Dom Lamothe's notes on the mosaics, to form some idea of the appearance and date of the destroyed church and its sumptuous decoration.

Two marble columns, V or VI century, from the Church of Notre-Dame La Daurade, at Toulouse
(Courtesy Metropolitan Museum of Art)

If no authentic documents exist for the early history of the church, there is an abundance of legends; for example, that the church was originally a pagan temple to Minerva or Apollo, built over the fabulous lake where was concealed the famous "or de Toulouse." But these legends are unsupported by facts. It would appear that the original building was from the first a Christian church, decagonal in plan, with six long sides and four short. It was roofed with a segmental cupola pierced by a central shaft, through which the light entered, as well as from a series of windows around the upper part of the walls. The interior walls were subdivided horizontally into three tiers of shallow niches formed by round-headed arches resting on columns.

In date this decagonal building may be assigned to the fifth or sixth century. Some time after the construction of the original church, it became necessary to enlarge the edifice, which was done by removing three of the long walls and adding a nave, the remaining part of the old building forming the sanctuary of the enlarged church; it was in this form that the church was seen by the seventeenth- and eighteenth-century writers. There are reasons to believe that this enlargement occurred not long after the completion of the original building, that is, within the general period of the fifth or sixth century. It was presumably at the time of the remodeling of the church that the walls of the sanctuary of the enlarged church were covered with mosaics, in which the liberal use of gold gave to the church its name of La Daurade (deaurata = daurade = dorée).

In the niches of the top tier were figured scenes of the Nativity and Epiphany—the Birth of Christ and the Adoration of the Shepherds, the Visit of the Magi to Herod, the Adoration of the Magi, and the Massacre of the Innocents. Figures of Christ and of His mother occupied the central niches in the middle tier above the high altar. They were flanked by the four archangels, the princes of the apostles, the evangelists and other apostles, the four major prophets and other Old Testament figures. In the lowest tier were lesser prophets, royal ancestors and patriarchs, and a scene of the archangel Gabriel with the three

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* *Reprinted in part from an article by Joseph Breck in the Bulletin of The Metropolitan Museum of Art.*

† *L'Abbé Degert, Les Mosaïques de l'ancienne Daurade, à Tolose, in Bulletin de la Société Archéologique du Midi de la France, Nouvelle Série No. 34, séances du 29 Novembre 1904 au 31 Janvier 1905.*

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youths in the fiery furnace. The wall spaces outside the niches were also richly decorated with designs of peacocks, doves and other ornamental motives.

Although the Flight into Egypt might have been added to the scenes of the infancy of Christ and other Old Testament personages introduced in the lower tiers, nevertheless, the presumption is certainly in favor of the belief that the mosaics as described by Dom Lamothe formed a complete scheme planned for the sanctuary of the remodeled church. The mosaics, which show Byzantine influence, must have been made earlier than the middle of the eighth century, since the invocation of the archangel Uriel, represented in the Toulouse mosaics, was forbidden by the Roman Council of 745. Various indications point to the fifth or sixth century as the period of production.

A Further View of the Sargent Decorations in the Boston Museum of Fine Arts

THIS photograph has all the character of an architectural projection, and shows the decorations as the architect would naturally plan them. Considering the different parts in relation to the whole it will be noted there is an absence of a sense of scale. Apollo and the Muses and the corresponding panels are one scale, not quite the same. The Three Arts is a different scale and the Sphinx and Chimera still another, while the small round pendentive paintings are unlike any of the others in scale. The same is true of the sculpture.

For further illustration of these decorations and descriptive article, see THE AMERICAN ARCHITECT, issue of March 29 (No. 2390).

Owing to an oversight it was neglected to state that the photographs of details used in the illustration of Mr. Blackall's article, are copyrighted by the Boston Museum of Fine Arts.

Notes on the Illustrations

Humble Oil & Refining Co. Building, Houston, Tex.

CLINTON & RUSSELL, ARCHITECTS

(See Plate Section for illustrations)

THE building for the Humble Oil & Refining Company, a subsidiary of the Standard Oil Company, Houston, Texas, is a building in which especial attention was paid to local climatic conditions. It may be said to be a good example of regional architecture. The building fronts on three streets and the arrangement provides for the maximum of sunlight and air. The building has a ground area of 31,500 sq. ft. and the area of each upper floor is 26,395 ft., the total floor area being about 264,000 sq. ft. with a net rentable area of 237,000 sq. ft. The ground floor is designed for stores with large show windows and a generous area reserved for a gymnasium for employees of the company. The greater part of the building will be devoted to the use of the Humble Oil & Refining Company.

The excavations were started in January, 1920, and the building was completed in September, 1921. The exterior walls are of face brick with limestone trimmings. The frame is of structural steel and the floors are of reinforced concrete covered with linoleum. The interior partitions are of clay tile and also gypsum tile, the roof being of clay tile covered with mastic. The staircases have mahogany trim, the office doors and trim being of hollow metal. The building is heated with steam and lighted by electricity. There are four Otis overhead worm gear traction machine elevators operating at a speed of 400 f.p.m., each with a capacity of 2500 lbs. The architects were Clinton & Russell, New York City, and the general contractor was James K. Stewart & Co., Inc.

Equestrian Statue of Francis Asbury

AUGUSTUS LUKEMAN, SCULPTOR

(See page 346)

MR. LUKEMAN has interpreted the spare and tireless circuit rider in long heavy cape of forward swinging line and broad, brimmed hat, absorbed in meditation, his mind far above the country lanes he travels. Settled low in the saddle, which during long days of travel and of preaching has become his study, he holds his well-worn Bible. One finger marks the place upon which the book is closed, while the preacher is oblivious to the immediate cares of his journey.

It is one of those periods of deep thought, when his tired horse, mindful of his master's mood and left to his own unguided will, has stopped momentarily. With arched neck, he reaches down and rubs his nose against his knee, still wet, perhaps, with the water of some stream just crossed.

Never before in an equestrian group has this pose of the horse been used, this downward swing of the head to the knee. No artificial pomp, or stilted conventionality, or showy splendor in the group could have so forcibly expressed the simplicity and truth of the figure.

Town Hall, Suippes, France

(From a Photograph by R. M. Blackall)

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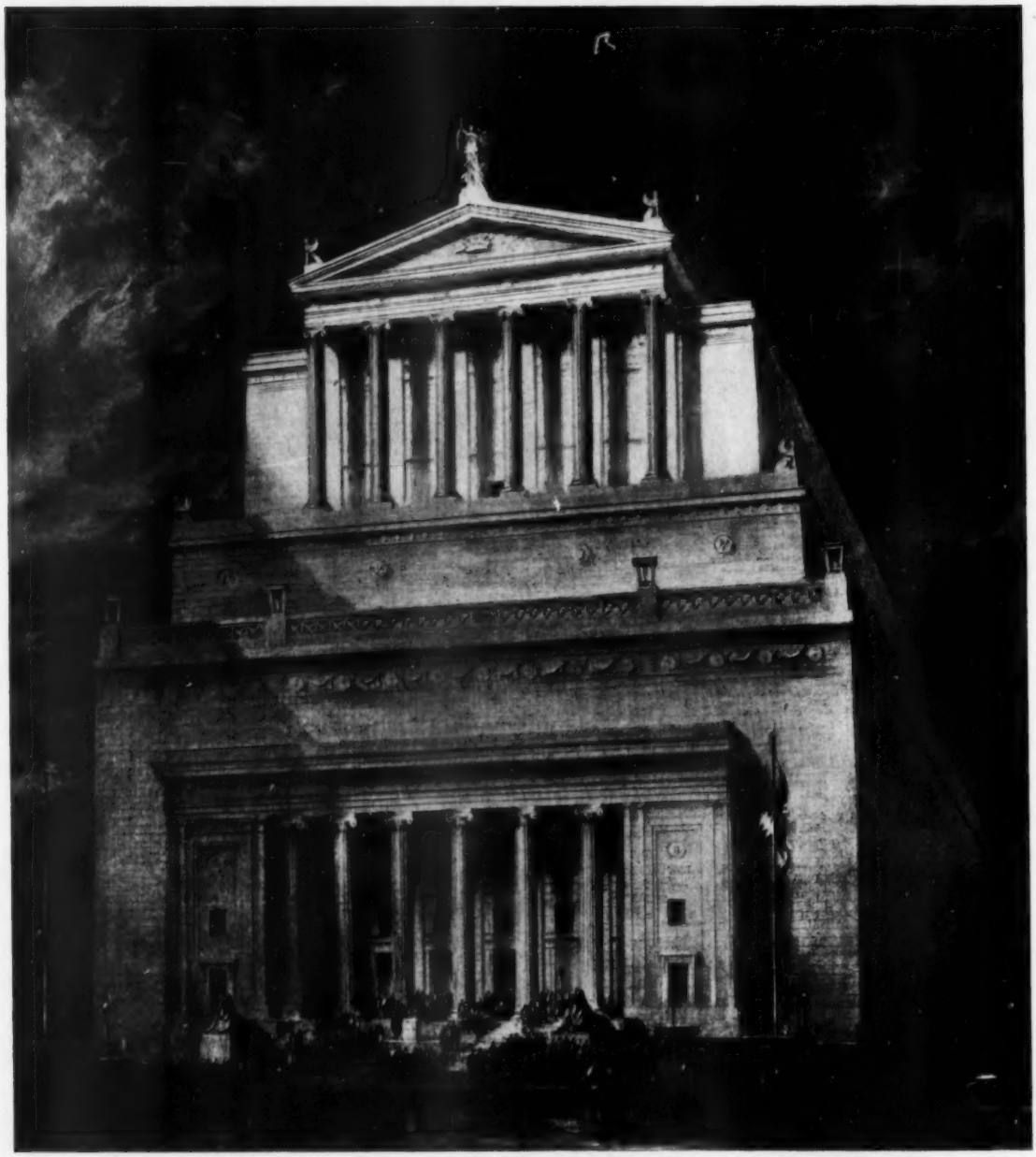

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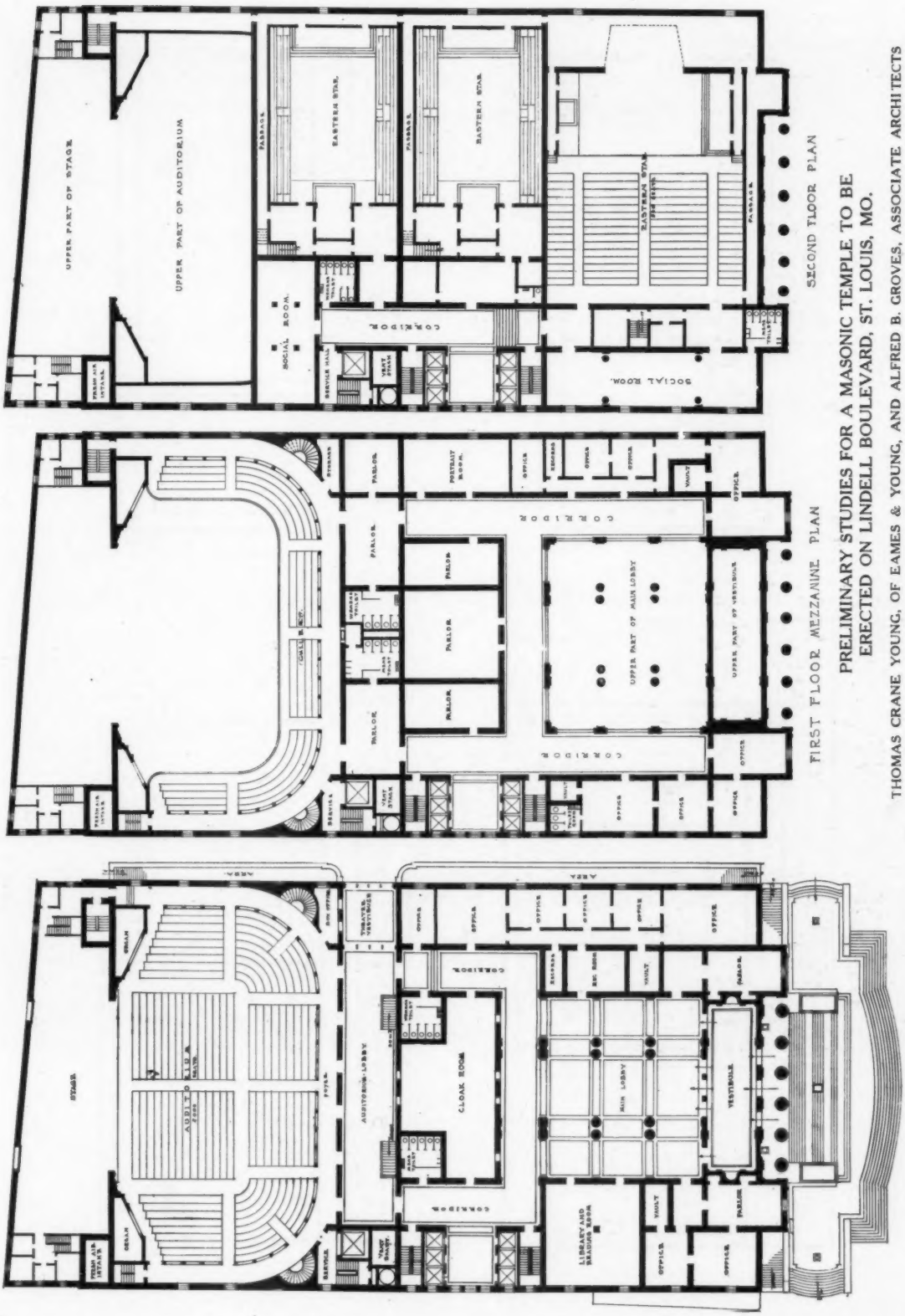
PRELIMINARY STUDY FOR A MASONIC TEMPLE, TO BE ERECTED ON LINDELL BOULEVARD, ST. LOUIS, MO.

THOMAS CRANE YOUNG, OF EAMES & YOUNG, AND ALFRED B. GROVES, ASSOCIATE ARCHITECTS

(From a rendering by Hugh Ferriss)



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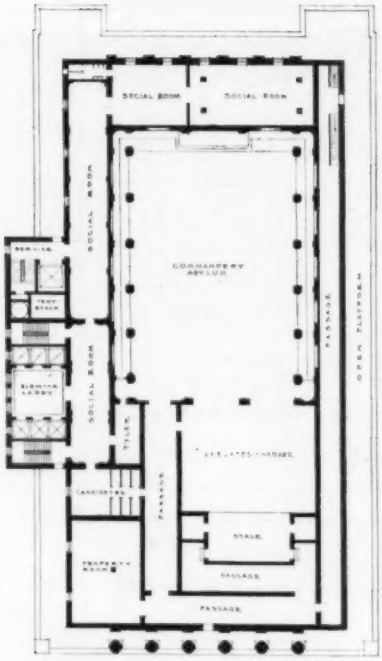
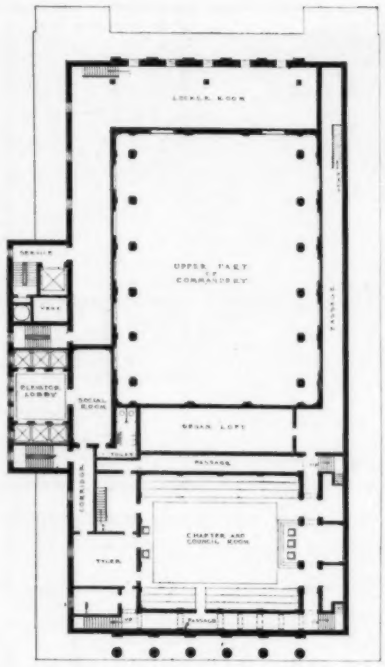
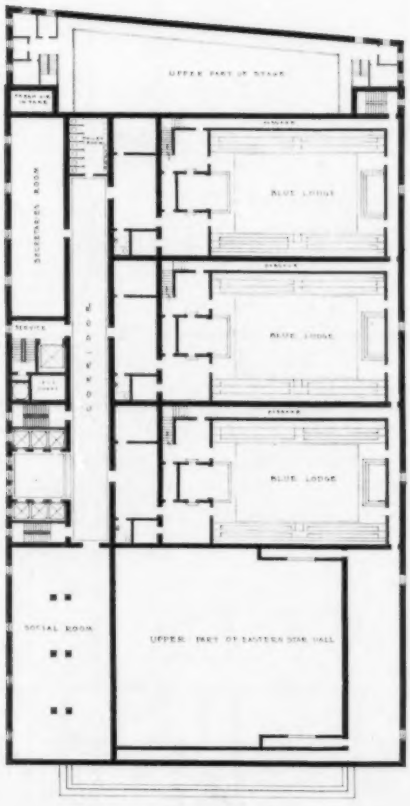


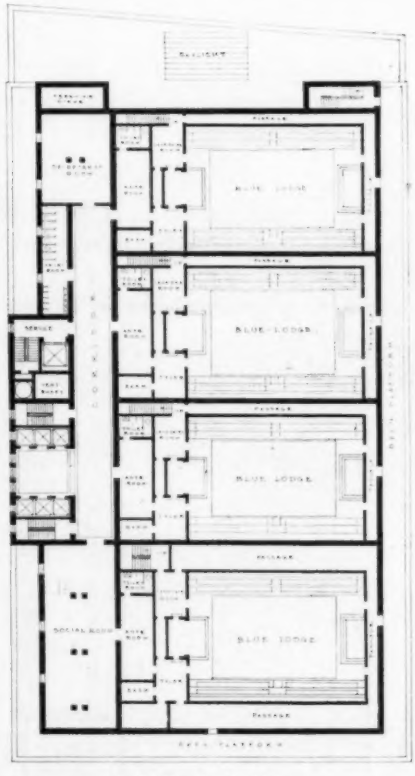
FIFTH FLOOR PLAN



FIFTH FLOOR MEZZANINE PLAN



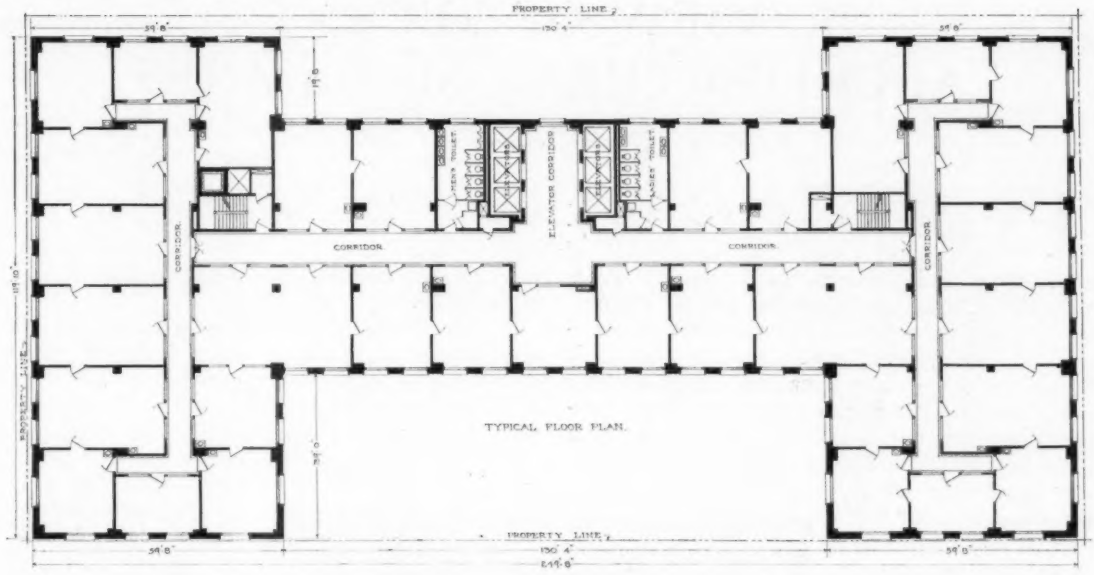
THIRD FLOOR PLAN

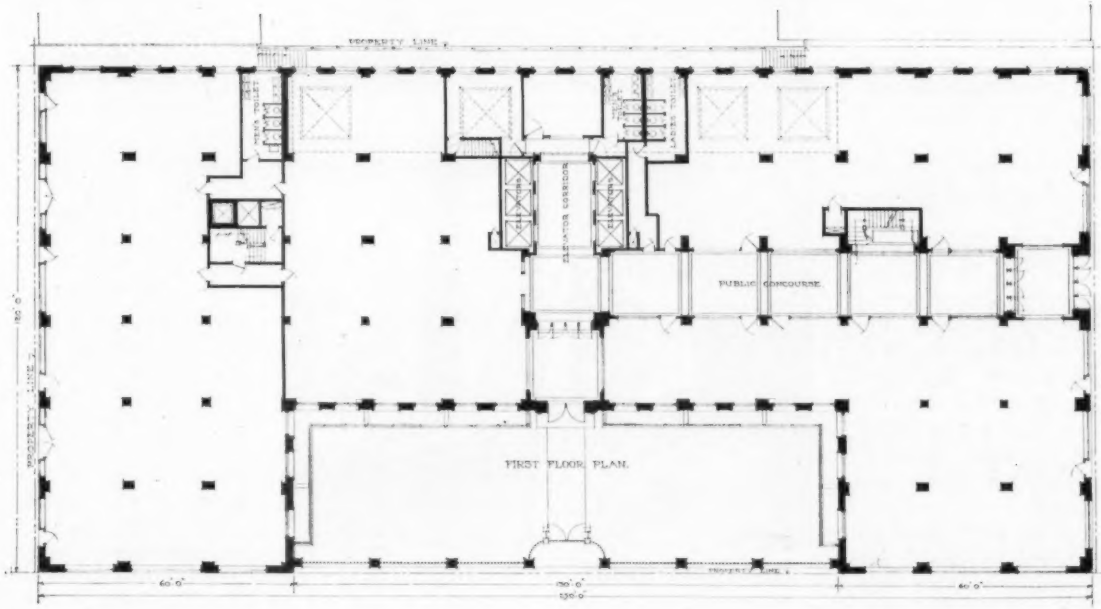


FOURTH FLOOR PLAN

PRELIMINARY STUDIES FOR A MASONIC TEMPLE TO BE ERECTED ON LINDELL BOULEVARD, ST. LOUIS, MO.

THOMAS CRANE YOUNG, OF EAMES & YOUNG, AND ALFRED B. GROVES, ASSOCIATE ARCHITECTS





FIRST AND TYPICAL FLOOR PLANS

BUILDING FOR HUMBLE OIL & REFINING CO., HOUSTON, TEXAS

CLINTON & RUSSELL, ARCHITECTS

(For exterior and interior views see Plate Section)

XUM

REVIEW OF RECENT ARCHITECTURAL MAGAZINES

BY EGERTON SWARTWOUT, F.A.I.A.

THE Architectural Record, March. Leon V. Solon in his third article on Polychromy deals with the technique of color effect, and the structural materials available. What he says is interesting and is well illustrated and his plea for the logical use of clay products is sound, if not novel; but just how this logical use of polychrome material can be adapted to modern architecture is not as yet clearly expressed by Mr. Solon. From the statement in a preceding article that the supporting members, that is to say the column and the architrave, are not ornamented, it may be presumed that it is the intention to construct these members of stone and the rest of the entablature in terra cotta or faience, a method of construction which may indeed be logical but certainly is not monumental. Any burnt clay product is necessarily restricted in size and is apt to be uneven in outline. It is conceivable that the metopes and possibly the triglyphs might be constructed of that material, but the cornice could not be. Then, too, the difference in texture and finish between the stone and the clay is so great that all effort of unity in the order would be lost. It is quite true that Greeks did mix stone and clay and even wood in some of their temples, but it is probable that the entire surface was given a finish that was substantially uniform. Then, too, it must be remembered that the Greeks did not use stone as we Northern races do; apparently they did not see any beauty in the stone itself, nor any monumental value in the expression of its construction; they concealed the joints to the best of their ability and carefully smoothed the marble to provide a field for the decoration, and if marble was not available they covered the rough limestone with stucco. And so with them was possible a form of exterior decoration that is not in accordance with our taste, nor our methods of building.

From "The Architectural Record"

East Loggia—Villa Dei Collazzi, Tavarnuzze, Tuscany

Harold Eberlein illustrates very fully the Villa Dei Collazzi in Tuscany which is rather better than the other villas recently published; and there is an article on the Lamont house by Walker and Gillette, in which article Mr. Matlack Price predicts that in 1940 perhaps some critic may say "a new kind of sanity appeared in city house architecture about 1922" etc., the sanity apparently being the successful effort to make picturesque details appear unpicturesque when symmetrically applied to a square box.

In the Portfolio of Current Architecture there is an interesting church interior by Maginnis and Walsh and a charming little stair detail in a store in Cleveland by Carl W. Broemel, and a farm group in Oyster Bay by Alfred Hopkins, who is unsurpassed in this line of work. Just to show how difficult it is to collaborate, Mr. James K. Smith publishes two schemes for a Memorial Park by Fellows of the American Academy in Rome, in which an architect, a sculptor, a painter and a landscape architect work together on each scheme, the results being quite what might be expected.

In the March issue of *Architecture* is featured the Library at Louvain, by Warren and Wetmore, very fully illustrated by excellent though small reproductions of the working drawings. The plan is interesting and simple, perhaps too simple for the style of architecture which has been adopted. The scheme seems a little too regular and balanced

and while undoubtedly practical, lacks the charm of the older work.

John Van Pelt writes of the combination of church and school in one building and shows how he has solved the problem in the case of Our Lady of Victory. The building is, from obvious reasons of economy and lack of space, rather boxy, but some of the detail, particularly of the entrance doorway, is excellent. The store fronts in Washington that George Ray has done have really remarkably good detail of a most refined character, but the fenestration is not always happy, though this is less apparent in execution than in the photographs.

Journal of the American Institute of Architects, March. In Shadows and Straws, the Editor quotes at length from Manchester and elsewhere certain wise words, as he terms them, anent

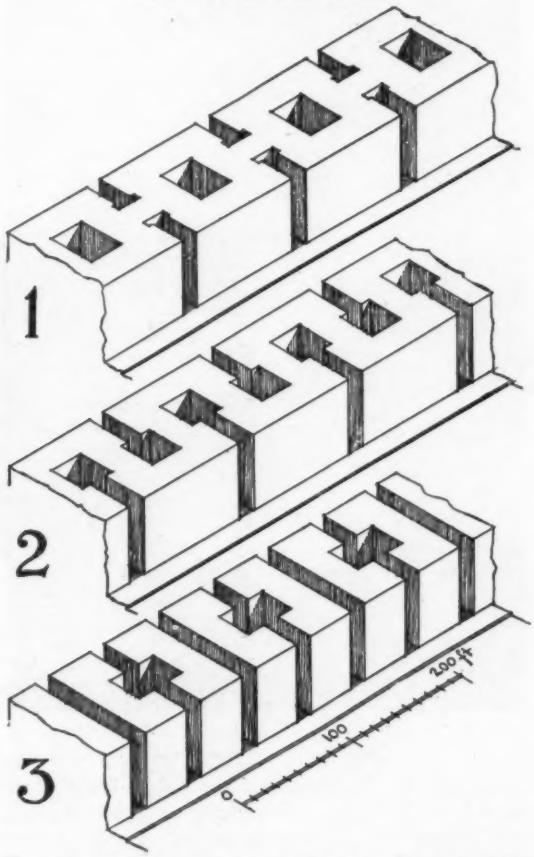
From "The Architectural Record"

Farm Group—Oyster Bay, Long Island, N. Y.
Alfred Hopkins, Architect

criticism of works of art; "The public ought not to lean too much upon the professional critic," who, it appears, criticizes halftone plates with a grand manner and flourish of trumpets and a vampire flapping of wings, all of which of course, especially the halftone plate outrage, is quite reprehensible. R. W. T. has a very good article, which he calls the Boomerang, on the wildcat competition fallacy that could well be reprinted as an Institute Document: and William L. Steele writes of the Architect and Engineer; a long article with various subheadings somewhat like the snappy head lines in a Middle Western newspaper. Apparently Mr. Steele does not like the French manner, nor the Beaux Arts men, with their "French tricks and smocks and expensive suites of offices" who "titillate the susceptible at pink teas." A shocking state of affairs truly! and everyone can readily see that the real and vital architecture of the future will be done, not by these gentry but by the serious youths with green shades over their eyes and with neat little aprons over their stomachs and with their sleeves carefully fastened up with elastic garters, and always with a slide rule conveniently handy; in fact, just the sort of youth that is to be found pictured in the advertising sections of most of our architectural magazines.

S. F. and F. S. Campbell give an interesting historical account of the Abbey of Glastonbury, apparently written as a preface to a description of the psychical research of Mr. Bligh Bond and his friend John Alleyne in the relocation of the Edgar Chapel, and other ruined portions of the Abbey. These two gentlemen, after reading to each other, hand in hand, a history of Japan, got in touch with some disembodied person who spoke

From "The Journal of the A. I. A."



The three types as they would appear in block development.—1. The Prize Plan. 2. Mr. Hood's Plan 3. Mr. Thomas's Plan. After many thousand years of progress man has gained such mastery over the material world that a large percentage of one-half of the population may choose circumstances permitting between these several types as his place of abode

or wrote ragbag Latin, and signed himself Guliemus Monachus, and who very considerately and quite correctly gave them a lot of detailed information, and even drew plans for them; and there seems also to have been one Johannes, who also came across as it were. We have heard before of the ghost system in English Competitions, but F. B. B. seems to have gone that one better, or rather two better. Nothing like having a handy spirit around in these days, to counteract the high cost of draftsmen's wages. We may find that Pa-

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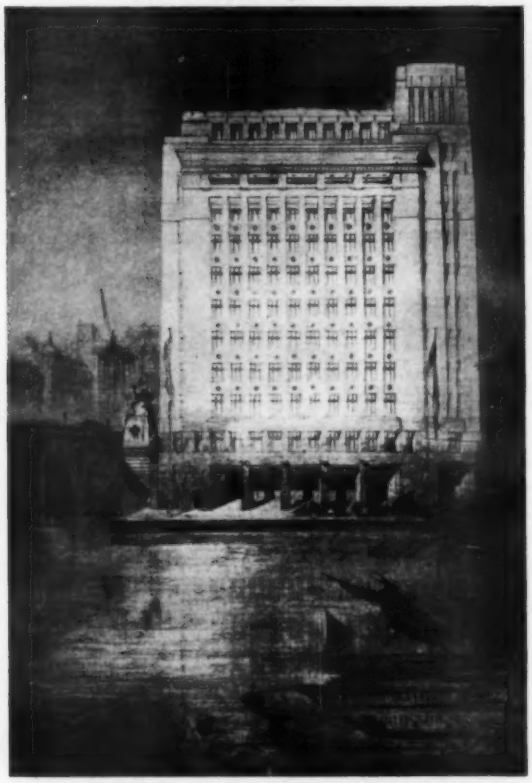
tience Worth is regularly employed in some St. Louis office and that Ouija Boards are being equipped with ruling pens.

F. L. Ackerman has an article on the Phelps Stokes Fund Tenement House Competition and seems to prefer the plan submitted by Andrew J. Thomas. We are not familiar enough with the competition program to express an opinion on the

From "The Architects' Journal," London



Adelaide House, London Bridge, Elevation to River
Sir John Burnet and Partners, Architects

judgment nor on the relative merits of the plans in detail, but from a common sense point of view, Mr. Ackerman is entirely right. The Thomas plan is much simpler, more economical and more livable, and Mr. Ackerman's isometric view clearly shows the great advantage in block development.

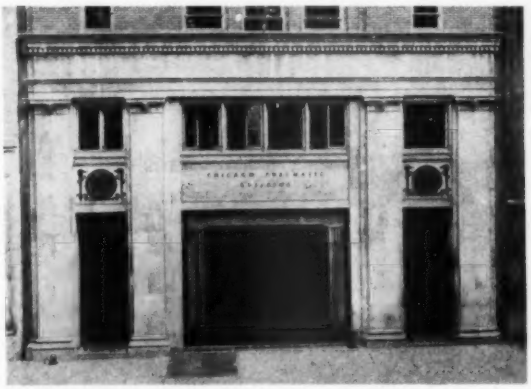
The Architects' Journal, London, March 1. The English papers have devoted a great deal of space to a lecture given by Mr. Arthur J. Davis before the Royal Institute of British Architects. Mr. Davis is a wet architect, so he said, a distinction that we should not imagine would be unique in that favored country, but on second reading it appears he referred in that way to his profession as a naval architect. He is the designer of many of the interiors in the modern liners and illustrated his lecture with photographs of Palm Gardens, Salons and Swimming Pools and spoke of the materials and methods of construction now in use, saying that plastered ceilings were quite common and very satisfactory. On being asked why an effort was not made to give a more nautical appearance to the interiors, he said that when he started his work he had the same idea, and had tried to introduce the curved lines of old-time ship construction and dolphins and that sort of thing, but that the owners induced him to make a crossing himself, and he found out that the people who travel nowadays are not especially enamored of the sea, nor were they fond of dolphins or even pirates. They were mostly seasick American women who would much prefer imagining they were in a hotel. All of which has a strangely familiar sound. The people who produce rotten plays say they do so because the public demands it. The movie magnates would really prefer to produce historical and moral scenarios but the public demands the other. A real estate corporation builds a skyscraper that cuts off all the light and air from their lowlier neighbor only because the public demands it. And so it goes. And the public seems to believe them and goes to the rotten plays and sees the salacious movies and rents the offices in the higher building. But do they really want it? To our way of thinking they do not, but they go to the plays and cross the ocean on these floating hotels because they have to if they go at all. If a person is going to be seasick he will be seasick whether he is in a cabin that looks like a cabin or in one that looks like the foyer of a third rate hotel in Peoria. Some day a wet architect will design a real boat that looks like a boat and great will be his name.

From *The Architect, London, March* 10, we reproduce a criticism which is timely in view of the rather extended notices given this extraordinarily successful effort to secure Governmental sanction and support to a nonsensical theory. "We have received from Mr. Harald Aars, of Christiana, a pamphlet in which he gives an account of a careful analysis he has made of Dr. Macody Lund's work, "Ad Quadratum," and it is very aptly prefaced by a quotation from Ruskin: "Do not think of one falsity as harmless, another as slight, and another as unintentional. Cast them all aside." Mr. Aars has examined a large number of the diagrams of "Ad Quadratum," many of which he finds incorrectly drawn, and others, when compared with larger drawings, incorrect in themselves. He further points out the convenience of small diagrams for one who, like Dr. Macody Lund, wishes to make out a case. The diagrammatic lines with which the small-scale plans are covered are so coarse and thick that it is difficult to check their accuracy. We ourselves went over some cathedral plans according to Dr. Lund's system, and in no case could we find any real correspondence. The whole work must be put

down as either the most amazing result of inaccurate drawing or as an attempt to deceive; and, seeing that the mistakes are in every case those which go to help Dr. Lund's theories, the last and least charitable conclusion would seem to be the more correct. We are surprised that the advisers of the Norwegian Government can ever have given the honor of their sanction to such an amazing production, but we hope they may yet, in the interests of truth and accuracy, disavow it and relegate the tissue of phantasies to the fate it deserves."

The Architectural Forum, March. The Henry E. Huntington Library in San Marino, by Myron Hunt, is a very interesting building with a landscape setting of the luxuriance that is possible only in California, and there is also illustrated a little Rest House at Mt. Auburn Cemetery, Cambridge, by Ralph Harrington Doane. Lewis E. Welsh has some very good examples of modern Colonial work, the Overlook cottage being very unusual, and the Town Hall at Greenfield, N. Y., simple and of excellent character. There is also a very good example of what can be done in commercial work as expressed in the lower portion of the Chicago Pneumatic Building, a view of which is herewith reproduced. Under the heading of Decoration and Furniture there are a number of illustrations that are well worth preserving.

From "The Architectural Forum"



Lower Stories of Chicago Pneumatic Building, New York
C. W. Fairweather, Architect

The Architectural Review, London, March. There is published a paper on Verona, recently read by W. G. N. before the Liverpool Architectural Society, illustrated by photographs and by the author's sketches, which is interesting, but is remarkable chiefly for the fact that W. G. N. considers the exterior of the Porta del Palio much finer than the interior face and speaks of the "pleasant and unusual treatment of the smaller doors." The treatment may be unusual but is far from pleasant, as the warmest admirer of the work of Sanmicheli will acknowledge.

There is a short article by Theodore Fyfe on the Scottish Survey; a collection of examples of Scottish architecture illustrated by photographs and drawings of the rugged bleak castles so typical of that country; and there are also some illustrations of the Uppingham School War Memorial, the last work of the late Ernest Newton, R. A., a small octagonal Gothic shrine, connected with the chancel of the present chapel, the interior treatment of which is unusual and successful.

From "The Architectural Forum"

Library For Henry E. Huntington, Esq., San Marino, Cal.
Myron Hunt, Architect

The Journal of the Royal Institute of British Architects, March 11, publishes a paper by H. S. Goodhart-Rendel on the Relation of Plan to Elevation which was read recently before the Liverpool School of Architecture. What Mr. Goodhart-Rendel has to say is well worth saying even if it has been said before; it is good, practical commonsense as applied to design and furthermore it is very well said, as the following short extracts will show: "Some people's way of expressing civic state in a block of municipal offices seems to be by hiding the plan within perfectly featureless walls and then plastering a peristyle all round it. Such folk remind me of dealers who deodorize home-spun tweed and then sprinkle over it the scent of peat-smoke out of a bottle." And also "By architectural truth, however, I do not mean hair-splitting. The architect who exhibits on his elevations every small irregularity of his plan is like the man who answers the question 'How are you?' by detailing every small irregularity of his stomach. If one window in a range has a higher sill than the others, and looks ill in consequence, it is adding insult to injury to explain that this is the expression of the pantry sink. . . . Either the pantry sink must remain unexpressed or else the symmetry of the façade must go. And the symmetry of the façade may be the obligatory expression of the general layout of the plan, a thing somewhat more important than the location of the plumbing."

From *The Architects' Journal, London, March 15th.* We reproduce a sketch of Adelaide House by Sir Robert Burnet and partners. This is a commercial structure facing Fishmongers' Hall on the North end of London Bridge, and is interesting as showing what the English architects are doing with high buildings.

Amendments to the New York Registration Laws

Editors, THE AMERICAN ARCHITECT:

YOU are, of course, aware that the State Legislature has recently passed some amendments to the New York law for the registration of architects.

One of the principal amendments is that which makes it the duty of the Attorney General to prosecute offenders. The want of a clear provision on this point in the law as originally enacted has handicapped the Regents in its enforcement.

Another amendment which will interest many of your readers is that which extends the exemption period. It will now be possible for competent architects who were in actual practice in New York State prior to the twenty-eighth day of April, 1915, to obtain registration certificates without examination if their applications are filed before the end of the current year, 1922, and on condition that they satisfy the Board as to their qualifications. All such architects may continue to practice without a certificate if they so desire. The amendment of the law does not affect the requirement in this respect, except to provide that every architect practicing without a certificate will have to file an affidavit that he was in *bona fide* practice one year before the law was enacted.

A third amendment to the law requires the payment of an annual fee by every registered architect in the State. This amendment was made at the request of the Regents who consider that this requirement will prevent fraudulent use of certificates and keep the list of registered architects free from dead wood. The annual fee for re-registration is $2.00, payable on or before September 1.

The other amendments are chiefly verbal ones in the interest of making the law more concise and clear, and removing one or two ambiguities.

One item of interest to the profession will be, that a definition of an "Architect" is now incorporated in the registration law, which reads as follows: "'Architect' means one who designs plans for structures and superintends or supervises their construction."

There is no change in the fundamental requirement of the law, that no one can practice architecture in New York State, or call himself an architect, without obtaining a certificate of registration, with the exception of those who were in the practice when the law was originally enacted.

The attention of all registered architects should be called to the fact that each is subject to heavy fine if he does not have recorded in the office of the County Clerk in the county in which the applicant resides, his certificate of registration, and have the certificate stamped upon the back by that official—fee $1.00. In case of loss of the certificate, the Board of Examiners should be notified.

Correspondence in reference to the registration law and requests for application blanks, or information relative to the law, should be addressed to the Board of Examiners and Registration of Architects, Education Building, Albany, New York. Payment for registration and annual re-registration should be sent to the same address.

D. EVERETT WAID,
President, New York State Board of Examiners and Registration of Architects.

New York Society of Architects

THE April meeting of the New York Society of Architects was noteworthy for the reason that there was an unusually large attendance. The Society expressed its approval of a recent decision by Justice Giegench, which gives architects the right of lien against property, whether they superintend construction or not.

The following were elected members of the Society: Edwin H. Denby; Aymar II. Embury, II; Richard H. Hunt; Maurice Deutsch; Thos. F. Price; Matthew Del Gaudio.

The Treasurer's report showed the Society's finances to be in excellent condition.

The next meeting will be the Society's annual convention, and will be held at the Astor Hotel, on which occasion there will be an entertainment for members and guests.

DEPARTMENT OF ARCHITECTURAL ENGINEERING

KNICKERBOCKER THEATRE COLLAPSE

Report of the Investigating Committee Appointed by the Associated General Contractors of America

INTRODUCTION

At a meeting of the Executive Committee of the Associated General Contractors of America, held immediately after the collapse of the Knickerbocker Theatre, a committee representing engineers, contractors, and the public was authorized to make an investigation and report of the matter for the Association. This committee was appointed as follows: Rudolph P. Miller, Consulting Engineer, formerly superintendent of the Building Department, New York; James Baird, Vice-President, George A. Fuller Company, and Guy Mason, of Mason and Spaulding, attorneys, Washington, D. C. W. P. Christie, Research Engineer of the Associated General Contractors, served as secretary and technical assistant to the committee.

The importance of the subject warrants the publication of the report in full with reproductions of the accompanying illustrations.—EDITORS.

PART I

CAUSE OF THE COLLAPSE

The collapse of the Knickerbocker Theatre roof is attributed by this committee to unseating of the north end of the main truss, primarily through failure of the northernmost top gusset plate of that truss and the bottom chord where it rested on the Columbia Road wall. This half-inch gusset plate, which furnished the only lateral stiffness of a heavy upper chord, buckled to the west, and the lower chord where it rested on the wall, without reinforcement for bearing stresses and eccentricity was crushed and tilted under a combination of tension, compression and torsion, or twisting stress. This action, which is later explained in more detail, culminated from many weaknesses of design, the most vital of which were as follows:

First: The over-stressing of steel roof members which produced excessive downward deflection of the main truss. This over-stressing resulted from (a) using loads for the design which were greatly exceeded by the actual load, (b) from reducing the height of the main truss, as originally designed, and (c) from failing to splice the top and bottom moment plates which were placed on the truss in short sections, and did not butt together.

Second: The designing of the main truss bearing so that the center of stresses fell on the edge of the wall, thus producing eccentricity and tension in the bearing.

Third: The failure to anchor trusses to the walls, especially over a short skew bearing at the wall support of the main truss. This design failed to provide for the additional outward thrust against the wall which developed, at such a bearing when the truss is deflected.

Fourth: The failure to reinforce the bottom chord of the main truss where it bore on the wall or even to connect the channels of this chord where they extended beyond the gusset plate to form the bearing. Thus no adequate provision was made in the bottom chord for three additional stresses acting upon it, over and above the load which it carried as a member of the truss. These stresses were (a) the full load of the north end of the truss, (b) a twisting caused by the skew bearing, and (c) the tension caused by the center of stresses falling on the edge of the bearing instead of at the center.

Fifth: The omission of a cover plate at the junction of the top chord and batter post of the main truss, thus limiting the stiffness of the truss to that of a half inch gusset plate at that point.

Sixth: The placing of a heavy concentrated load on a high and relatively thin hollow tile wall, neither adequately braced nor integrally bonded and further weakened by many openings and chases.

Seventh: Lack of adequate diagonal or other bracing throughout the steel structure and especially around the two columns carrying roof trusses, thus providing insufficient rigidity to the structure as a whole.

One or possibly all of these weaknesses might have been present in the building without causing collapse—had their effects been distributed to various parts of the structure; but unfortunately it occurred that these effects combined and concentrated at the north end of the main truss. The culmination of this condition in a final collapse is herewith summarized:

As already mentioned, the actual roof load greatly exceeded the design load; the main truss was reduced about nine inches in depth from the original design, and its moment plates were neither butted together nor spliced. These factors all produced excessive downward deflection of that truss. This deflection, acting on the skew bearing, created a thrust at the Columbia Road wall, which tended to push the wall outwardly and to twist the bottom chord of the truss. Either of these movements, occurring in but a small degree, was capable of unseating the truss, as its bearing perpendicular to the wall was only six inches and that parallel to the bottom chord eight inches. (See Fig. 2.)

To resist this twisting force the only stiffness provided was that of a half-inch gusset plate and of the bottom chord in the first panel. The batter post could contribute nothing as its rigidity was in turn limited by a half-inch gusset at its upper end. (See Fig. 11.) Thus the bottom chord, from the twisting force alone, was probably in a hazardous condition. Furthermore, the two 12-inch channels forming this member extended beyond the gusset plate with their webs unsupported, forming an eccentric bearing. (See Figs. 5 and 10.) These webs therefore took practically the full bearing load of the truss and the stress from its eccentric bearing as well as the twisting force. Under such a combination of stresses failure in the bottom chord, or bearing, was at some time almost inevitable. A condition existed that would have been dangerous with a thoroughly adequate wall, and when with this was combined a thin wall badly cut up by openings, a condition must have existed which awaited but an additional load, a measure

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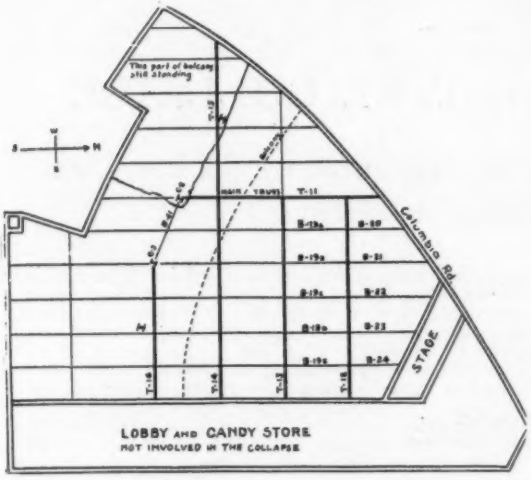
of vibration or fatigue of the over-stressed metal to result in a collapse.

The additional load and probably the vibration and fatigue were present when the roof gave away. A snow load of some twelve or thirteen pounds per square foot, or about 16 per cent. of the dead load (computed from precipitation recorded by the U. S. Weather Bureau), ex-



Note.—Over column C-2, which stopped at the bottom chord of truss T-11, a strut was erected to carry three beams at the roof level. This arrangement is shown in perspective in Fig. 5-C. This strut framed into the bottom chord of the truss so that C-2 had no lateral bracing other than that provided by 6 bolts through the flanges of the truss. Column C-3 extended up to the roof. The other two columns shown stopped at the balcony floor.

Fig. 1. Roof Framing Plan Knickerbocker Theatre

clusive of possible drifting, and the heaviest since completion of the building, was on the roof. Vibration from passing street cars had been noted on the structure and was doubtless accentuated at times by a double eight-foot ventilating fan carried on the roof. The snow load which increased the dead load at the north end of the main truss some 15,000 pounds was, so to speak, the last straw in destroying equilibrium at the support. It undoubtedly provided the additional stress necessary either to buckle and twist the member resting on this bearing, or to buckle the gusset plate above. Which action took place first it is impossible to state, but that both actions did occur is shown by the distorted steel members and marks on the north bearing. (See Figs. 2, 3 and 4.)

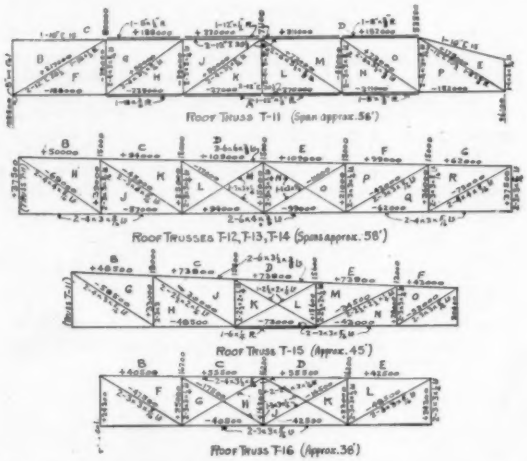
When the web of the east channel of the bottom chord buckled, the top of that member (not the whole truss) was twisted eastward, thus unlining the batter post, and moving the center of stresses off the bearing. With the bottom chord in this condition only the lateral stiffness of the wall could prevent the truss from sliding off. This stiffness the wall did not have. It was pushed outward about five inches—sufficient to break its bond with the stage wall, to break the stage wall itself, and to allow the truss to drop.

Whether the upper gusset plate or the bottom chord channel failed first is immaterial, as either action would have brought about the other and would have thrown the batter post out of line. Once this member was displaced, collapse readily followed. Unlining or distortion, of the batter post is a condition that easily results in failure of even a well-built truss.

No failure of an auxiliary truss was essential to unseat the main truss, and no failure of a beam, as they were actually erected, is believed to have been capable of causing a failure in the auxiliary truss T-12. In no member of the steel, except the bottom chord mentioned, has any evidence of failure between supports and before falling been found. Collapse through a succession of preliminary failures seems highly improbable in view of the difficulty experienced in efforts to cause collapse when demolishing structures.

It is common knowledge to men of experience in the wrecking of old buildings that a sudden collapse or giving away of any large portion of the structure can be affected only by destroying a major supporting member. The only member of this nature existing in that area at which eye witnesses say the failure began was the north end of the main truss and the suddenness with which this truss collapsed seems to preclude the possibility of it having been unseated by the failure of a minor member of the steel framing.

Various reports on the Knickerbocker have assigned the collapse to one or another preliminary failure, while at least two have located the initial action at the north end of the main truss. For the purpose of bringing out more clearly the actual and probable facts, the more comprehensive theories advanced are reviewed in Part II of the report. There also is given a more detailed discussion of conditions present in the structure, together with sketches, evidence, descriptions and further reasons for believing



Note.—This figure does not appear in the report. It was copied from the drawings filed with the Building Department and is here given in reply to requests for the data. No dimensions were given on the originals which were drawn to scale.

Figure 1B. Stress Diagrams of Trusses

that failure did not originate in any auxiliary member of the structure.

Responsibility

In the erection of a building, particularly a building to be used as a public gathering place, all persons engaged in designing and erecting the structure, like the operators of public utilities are jointly and severally responsible for its safety. This responsibility is entailed by the fact that their operations are intimately connected with the public welfare.

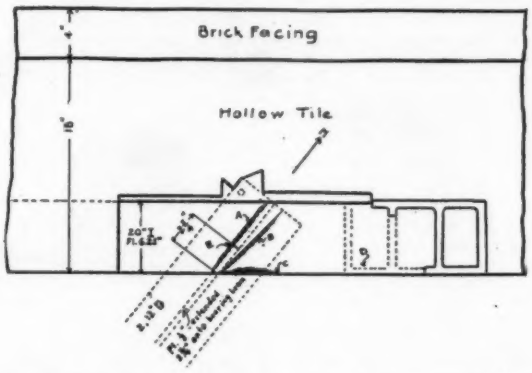
The highest degree of responsibility undoubtedly rests upon the architect, as it is upon him that an owner relies for a properly constructed building; but every other agency involved in the project has an individual responsibility for the character of its work. This individual responsibility may be somewhat limited by practical limitations of service, but, nevertheless, it is constantly present. Each agency presuming to render construction service, from the contractor to the fabricator, is obligated to communicate to the architect any knowledge that may bear on the safety of the structure. If any agency finds that, in its judgment, changes should be made in the plans to insure structural safety, it is the duty of that agency to notify the architect. The co-operation of the local building authorities should also be constantly sought.

It is essential that a clear distinction be made between

design, design details and construction before responsibility can be determined. For this reason, a brief statement of what comprises the service and duty of each agency is given in the following sections:

1. Municipal Approval and Inspection

Municipal approval and inspection are a service rendered to the public to insure it that buildings shall be erected in conformity with zoning, occupancy, health,



A and B indicate the bearing marks made by adjacent edges of the lower chord channels, showing that these edges spread apart while the truss was on its seat.

C indicates abrasion under the east flange of the chord.

D indicates tile broken by the end of the truss and by a vertical strut framed on to the extension of the lower chord.

E shows the north edge of the gusset plate.

Note.—The two 12-inch channels forming the bottom chord of the main truss had but 8 inches of bearing on the west wall measured along the center of the chord. They also overran the gusset plate 5½ inches. Thus the two channels were practically independent of each other as far as bearing strength is concerned. This arrangement also placed the center of stress on the edge of the wall, producing an eccentricity of about four inches. The two channels with their ends free, therefore, were subjected not only to the end load of about 110,000 pounds but also to the bending stress caused by this eccentricity. The web of the west channel at the end was still straight after the collapse, while that of the east channel was rolled up as shown in Fig. 4. Fig. 3 shows the probable position of these webs prior to collapse as indicated by the bearing marks. Fig. 4 shows their condition after the collapse.

Fig. 2. Sketch of North Bearing of Main Truss Showing Position of Truss on the Bearing

building code and other requirements laid down by public authority. Its scope may include, in some instances, investigation into features of design, but completely to check the design of each structure erected would exceed the working capacity of a municipal building department. It would require a staff of experts almost equal to the combined forces of private designers and would entail an expense and duplication of work too great for a municipality to bear. Field inspection also is limited by a like consideration of expense. Inspectors are obliged to cover an extended area of the city and to divide their time between a great number of buildings. Strict detailed field inspection would require an inspector constantly on each building, as a great amount of work may be executed in his absence. So far, this has been an excellence of service which the building department's appropriation will not permit. Therefore, to ascertain whether an employee of the department is culpable because weaknesses of design or construction are incorporated in a structure, it is necessary to determine whether it was reasonably possible for him, considering the magnitude of his duties, to detect those weaknesses.

The function of the building inspector's force is analogous to that of the police force. and it can be held responsible for infraction of building regulations in just so far as the police force can be held for infraction of other laws. In neither case should the full responsibility for the result of such infractions be shifted to the guardians of public authority. In the case of the Knickerbocker, responsibility for the disaster cannot be justly laid to employees in the department of building inspection, except in so far as it may be shown that an official or employee has failed in his duty of apprehending any violation of the building code. But even if this is finally shown to have occurred, it would in no sense relieve the other agencies of construction from their respective responsibilities. Such a course would not only be equivalent to charging a policeman with responsibility for a murder in his precinct, but it would set a dangerous

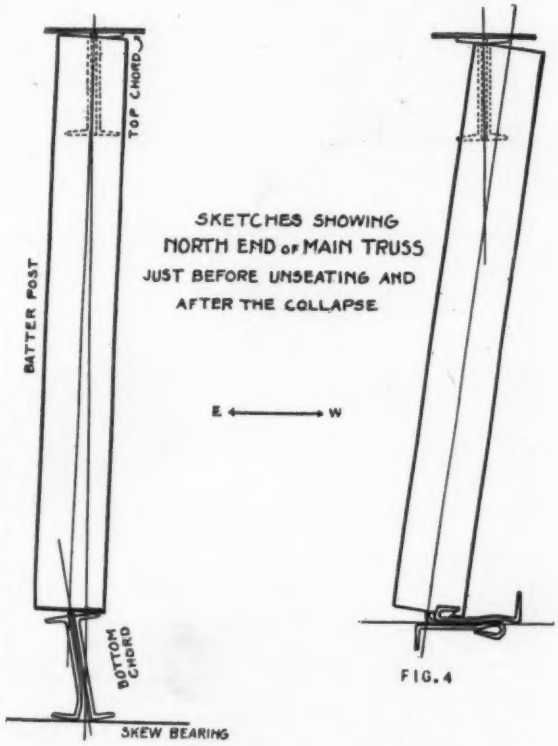


Fig. 3 shows the probable condition of the lower chord prior to unseating of the truss as indicated by the bearing marks shown in Fig. 2.

Fig. 4 shows the approximate condition of batter post and chords when the members were separated by cutting torches during the rescue work.

Fig. 3 **Fig. 4**

precedent in removing from architects, engineers and contractors the responsibility for their actions.

2. Design and Supervision

Design and supervision constitute the service rendered by an architect, or an architectural firm, to a client who is the owner. Unless otherwise agreed between these two parties, the former is obligated to execute a safe design; to supply adequate plans and specifications for estimating the cost and erecting the building, and to furnish supervision that will insure its erection in accordance with these instruments. This service may not include the drafting of detailed working drawings which are sometimes made by the contractor or a manufacturer, but it does include checking and approving such drawings regardless of their origin.

To insure that the owner's building shall be erected as specified, the architect should place on the work an inspector or superintendent. This supervision serves not only to safeguard the interests of the owner, but also, in

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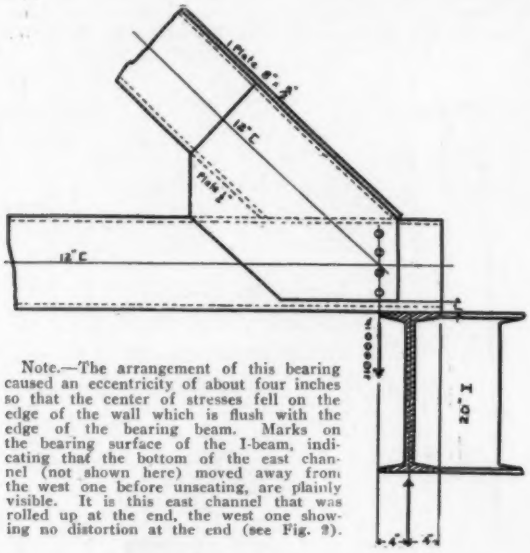
public buildings, to insure the safety of the public. Even when the architect is confident of the constructor's skill and responsibility the failure to provide this supervision is a dangerous practice which cannot be too strongly condemned; and it is especially dangerous when adequate detail drawings and specifications are lacking. The contractor is not a designer, does not know the stresses which



Note.—The arrangement of this bearing caused an eccentricity of about four inches so that the center of stresses fell on the edge of the wall which is flush with the edge of the bearing beam. Marks on the bearing surface of the I-beam, indicating that the bottom of the east channel (not shown here) moved away from the west one before unseating, are plainly visible. It is this east channel that was rolled up at the end, the west one showing no distortion at the end (see Fig. 2).

Fig. 5. Sketch Showing West Half of Main Truss and Bearing at Columbia Road Wall

determine the design, and should have adequate supervision and consultation to execute the work as it is planned.

If any parts of the building, built in accordance with plans and specifications as either drawn or accepted by the architect, are found to be inadequate or improper, then he cannot avoid responsibility for the condition of such parts. Neither can he disclaim responsibility for violation of the plans and specifications, if laxity in supervision has made such violation possible; though in the latter case the agent of the violation should be held fully responsible for his own acts.

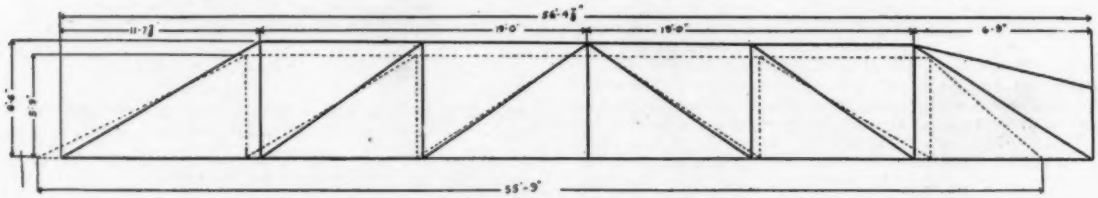
by the architect upon their approval. Adoption of this design obviously entailed responsibility to the owner for its safety, but, on the other hand, did not in any sense release the fabricator from responsibility for departures from safe practice.

As the details of structural steel fabrication are practically standardized, the responsible fabricators may usually be relied upon to execute a safe design for any given conditions. Many of them maintain thoroughly expert designers whose system of detailing and checking practically precludes an error. For this reason individual architects have placed in them a great degree of confidence. But the steel design of the Knickerbocker contained serious departures from established practice, which are believed to have been a vital factor in the collapse, and while the architect may be culpable for not checking it, the fabricator, in whom he relied, cannot escape his moral responsibility for these departures. A tabulation of items showing departure from safe design is given elsewhere in the report.

3. Construction

Construction, which is a service carried on under the supervision of an architect and performed by the general contractor, consists in furnishing materials and building the structure as shown by the architect's plans and specifications. It involves the sub-letting of various portions of the work which the general contractor's organization does not perform, and generally carries with it the responsibility for the work performed under such sub-contracts. It does not include design. However, it may occur that a sub-contractor seeks to change some feature of the design in order to simplify the construction or because certain materials are difficult to obtain. In that event he prepares a design, or such drawings, as may be required to show the alteration, and these must be accepted by the architect before any change or substitution is allowed. In such instances the sub-contractor obviously becomes an agent of the architect in supplying a design, as well as an agent of the general contractor in executing the work. For ultimate execution of the work, in accordance with the design, the contractor should be responsible, but for the adequacy of the alternate design he should share no responsibility.

The situation here cited occurred in constructing the Knickerbocker, and the design has been found inadequate, but it should be pointed out that unless the construction has varied from this design, or from other plans and the specifications, the contractor should not be held responsible except in so far as he may have been a party to an infraction of the law. Otherwise expressed, he is responsible for the character of workmanship and materials



The solid lines represent the stress lines of the main truss, as shown by the fabricator's stress sheet. The dotted lines represent the stress lines of the fabricated truss, as determined from measurements taken after the collapse.

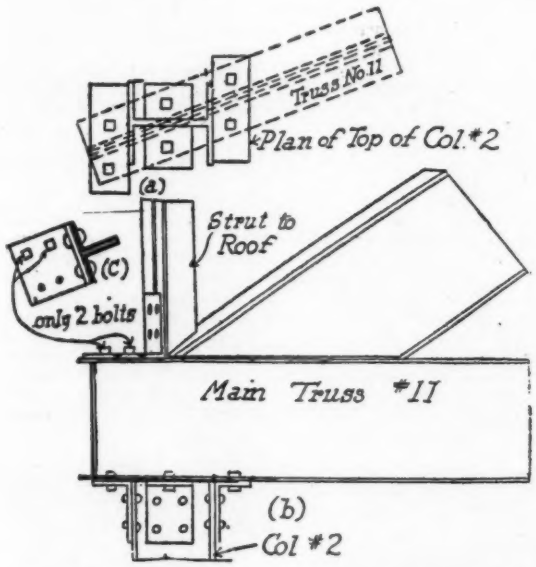
Fig. 5A. Stress Lines of Main Truss

In so far as any portions of the Knickerbocker Theatre, which were built as shown by the plans and specifications, are found to be a departure from the dictates of safe practice to that extent the design and supervision are responsible. In considering this matter, however, cognizance should be taken of an unusual circumstance involving design of the steel roof members. The fabricator, on account of difficulty in securing certain material, submitted an alternate design of his own, and this, it appears, was approved by the building department and accepted as specified in his contract and for infraction of the building code.

No evidence has so far been found to indicate that the building was not constructed in accordance with the plans and specifications, except that evidence given at the coroner's inquest indicates that the contractor added a reinforced concrete band running through the full length of the wall which carried the main truss, and strengthened the hollow tile under the truss support with concrete. This, it was testified, has been done because the wall

seemed to the contractor to be of inadequate strength and in need of reinforcing. An examination of the wreckage indicates that the contractor used materials of suitable quality throughout the construction and that the workmanship was of a kind that should be expected in work of this nature. Several defects of workmanship have been found in the structure, but they appear to be of a minor character and not involved in the collapse. These defects are discussed elsewhere in the report.

In view of the evidence obtained by the committee's investigation, and by that of the coroner, no responsibility



The vertical strut shown carried three beams as indicated in Fig. 5C. This strut bent over on the side where the two bolts were missing, breaking the two which were in place. Had the missing bolts been in place, they would not have resisted this action. [*Redrawn from sketch by T. L. Condron.*]

Fig. 5B. Arrangement of South End of Main Truss

appears to rest upon the contractor by reason of the quality of his work or any non-compliance with the plans and specifications; but by conforming to these instruments, as required in his contract, which did not provide for anchoring trusses to the walls, he was made a party to infraction of the building code. Under the Washington Code, which places responsibility for observance of its requirements upon "any person or persons, whether as principal agent or employee," it appears that violation thereof entails joint and several responsibility.

4. Ownership

Ownership is charged in the erection of a building, and especially of a building used for public gatherings, with securing such design and supervision service as will insure its safety. It is the duty of ownership to insist upon adequate inspection and to pay a fee for architectural service sufficient to provide such inspection. If the owner presses his architect to reduce this fee below that commonly recognized as necessary to give adequate inspection he should not expect the building department to relieve him of responsibility for such action. Should the owner induce his architect to reduce the cost of structural design at the risk of endangering its safety, he jointly with the architect should share responsibility for the results.

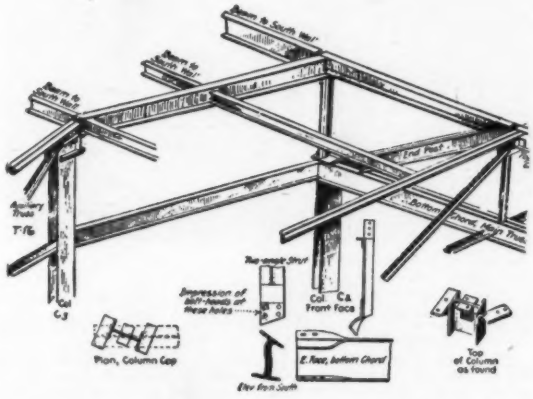
In the case of the Knickerbocker, the architectural fee, as shown by evidence at the coroner's inquest, was lower than that advised by representative architects, and an examination of the building indicates that while the decorative features were elaborately executed, structural features were inadequately provided for. Whether any action of the owners resulted in this condition has not been determined, but, if so, the ownership should share the responsibility.

Recommendations

Investigation of the Knickerbocker disaster has forcefully emphasized four factors which have vital bearing upon the failure of this structure and which this committee believes should be called to the attention of owners, engineers, architects, contractors and public officials.

1. Building Approval and Inspection

Under the present system of providing funds and administering municipal building departments it is seldom possible fully to check every design or to provide constant inspection of the work—the appropriation is too small. Expenses of the department are often drawn from the general tax funds, and thus place a burden upon all taxpayers, for services rendered for the most part to but a



The lower strut between the two columns was not in the original design. This sketch shows the flimsiness of the design at column C2, which was displaced from the truss without distortion. [*Redrawn from Engineering News-Record.*]

Fig. 5C. Arrangement of Steel at Columns C2 and C3

few. Under this system the department does not receive sufficient funds to render the service desired.

More extensive service could be provided if a charge, depending upon the value of a structure and sufficient to pay for checking design and for inspection, were made for each permit. This would place the cost of such service upon those who build, and would require from the general fund only an appropriation necessary to cover clerical and other general expense of the department. The cost of permits upon buildings used for public gathering could thus be made to provide whatever degree of inspection is advisable.

2. Design and Supervision

The expense of designing, drafting plans and supervising the construction of a modern building are fairly well established, and the fees which must be charged an owner to cover the expense of this work and provide a reasonable profit, are fixed within rather narrow limits. These fees cannot be substantially reduced without lowering the character of service rendered. They are generally adhered to by representative men of the profession and are recognized as a reasonable minimum charge.

Some members of the profession, however, on account of strong competition in the architectural field and the tendency of owners to shop for professional services as they

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would for coal, will accept inadequate fees; and when they do are obliged to reduce the expense of design and supervision to such an extent that they are unable to furnish adequate supervision or complete plans, specifications and details. This condition forces the contractor, whose function is not to design, to construct the building without sufficient drawings as best he can. The safety of a structure may rest upon these details and failure of the designer to provide them constitutes a dangerous gap in his service. In the case of the Knickerbocker the plans and specifications were not complete, and testimony before the coroner showed that the inspection was inadequate.

(C) *Underwood & Underwood*

This photograph shows the structure of the Columbia Road wall, the crack where this wall joins the stage wall, and where it pulled the stage wall apart. It also shows the north main truss bearing and truss T-12.

The stage wall crack runs diagonally downward from the bearing of beam 22 in that wall, which is the westernmost of the three stage wall bearings. The main truss bearing spans the third window from the stage in the Columbia Road wall.

Truss T-12, which is resting with one end on the east wall, shows sharp buckling on both edges of the top chord, where this member was pinched by the beams on each side as it preceded them in its fall. This truss was cut to pieces in the rescue work.

Fig. 6. Interior of Knickerbocker Theatre Looking North

In any building there are items of construction unforeseen by the designer which must later be added, but when, on a structure like the Knickerbocker, costing about $77,000, there are more than fifty such items, there would appear to have been incompetence, indifference, or both.

The committee recommends that the fees of architects and engineers be made sufficient to enable them to give competent and complete service. Fees recommended by the American Institute of Architects and the American Institute of Consulting Engineers are reasonable and proper and have had recognition by the courts.

3. Standardized Building Code

Municipal building codes throughout the United States have generally developed independently by a process of accumulation, until it is now practically impossible for either an architect or a contractor to have cognizance of all the provisions in force in the various localities of his work. Many of those codes are deficient in vital particulars, to such an extent that an unsafe structure can be built without infraction of the regulations; for example, light and flimsy wall construction which in the Knickerbocker Theatre was a weak element if not a direct cause of the collapse. A comprehensive and well-arranged code in any city would doubtless tend to reduce the possibility of disaster.

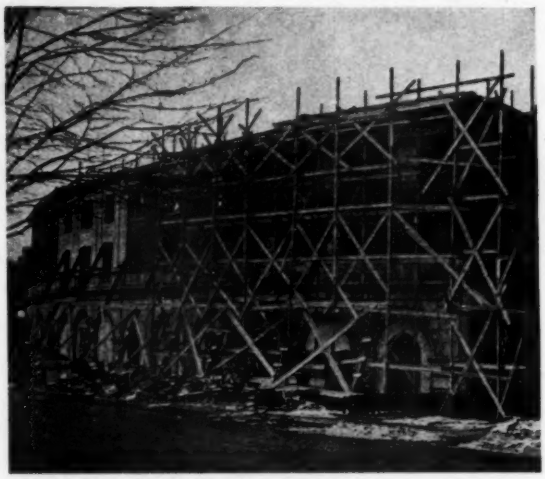
4. Registration of Architects, Engineers and Contractors

Licensing of architects and engineers before they are permitted to practice has been advocated by various groups within these professions for some time, but the effectiveness of this requirement in preventing disasters seems questionable. Such a measure might merely limit the number of persons engaged in these professions.

What is needed is a method of fixing a greater responsibility for safe and legal work. The committee believes that this can be accomplished by requiring designers, and constructors as well, in all branches of building work, to seek registration with the building authorities before permits are issued to them. Such registration should be withheld if the applicant is unable to show his competency, responsibility and willingness to comply with legal requirements. In accepting the permit the registrant would further assume responsibility for the safety and adequacy of his design and for its execution in accordance with the conditions of the permit.

While the registration fee might be nominal, the penalty attached to violations of the permit should be sufficiently exacting to make the provisions effective. Cancellation of the permit and loss of the right to operate for a given period would doubtless prove effective. Registration of this kind would tend to restrict the planning and erection of building to those who are competent and responsible—a result that is greatly to be desired.

This committee recommends that engineers, architects, contractors and public officials be urged to advocate application of these recommendations, and, if necessary, the adoption by proper legislative bodies of laws putting them into effect.



(C) *Underwood & Underwood*

This photograph shows the great amount of open space in the wall which is, in general, 18 inches thick, 40 feet high, and composed of two thicknesses of tile. At that section showing in white, the top is pushed out five inches. The wall shows three or four cracks from top to bottom to the right of this area.

Fig. 7. Columbia Road Wall of Knickerbocker Theatre

PART TWO

History of Construction

The construction of the Knickerbocker Theatre was begun late in 1916 and completed in the fall of 1917. The original steel work consisted of beams and girders, following the general layout as constructed, but the difficulty of securing certain materials during the war period prompted the fabricator to submit a design of his own involving a system of trusses which could be built from

material on hand. This design was approved by the building department but, according to testimony at the coroner's jury, never checked by the architect.

During the course of construction a strut not originally contemplated was added to furnish bracing between the two columns supporting roof loads, and at the instance of the contractor, a reinforced concrete girdle was built into the west wall, at about its center and extending practically throughout its length.

The roof slab, which has been considered an important factor in various analyses of the collapse, was poured about the first of June, 1917.

Description of Building

The shape of the building was approximately that of a half segment of a circle, with the arc running parallel to Columbia Road and one side paralleling 18th Street. Part of the building at the intersection of these two walls was occupied by the theatre stage and a store and that portion facing 18th Street by the lobby. Neither that part of the building comprising the store nor that comprising the lobby was involved in the collapse. (See Fig. 1.)

(C) *Underwood & Underwood.*

This photograph shows column C-2 with its bottom resting on the balcony and its top resting on the ground. This column is not deformed and still has much of the plaster clinging to it. In the foreground is shown truss T-12 with beams 23 and 19d still attached. Near the top of the picture is a section of the roof slab. This slab, though but three inches thick, was capable of withstanding the shock of falling.

Fig. 8. Interior of Knickerbocker Theatre Looking South

The curved wall, which is the only one concerned in the roof failure, varied from 13 to 22 inches in thickness, but the main body of it was 18 inches thick, and composed of two thicknesses of 8-inch hollow tile with a space of about two inches between. On the street side of the wall was a facing of brick, stone or stucco approximately four inches thick, which under the Washington Code could not be considered as an integral part of the wall. The average height is slightly over 40 feet above the sidewalk.

The steel work as constructed consisted of a main truss 6 feet, 6 inches deep which rested with one end on the curved wall and the other on a column. This truss, running north and south, carried certain beams and four auxiliary trusses, three from the east wall and one from the west. Another truss with certain beams rested with one end on the east wall and the other on a second and the only column extending to the roof. The upper flanges of all beams and of the top chords of trusses, excepting the two batter posts of the main truss were imbedded in the concrete roof slab.

This view of the wall bearing of beam B-22, looking north, shows the actual bearing surface outlined by cement which was spilled upon the bearing plate during construction. The undisturbed cement and the tile on the left side of this bearing indicate that beam B-22 did not leave its support by moving westward. This action is a fundamental factor in various theories of collapse which have been offered.

Fig. 9

The roof slab having an average span of about 10 feet, was three inches thick, and reinforced with No. 6 wire mesh, three inches on center. The ceiling was suspended partly from the steel members and partly from the roof slab. On top of the slab was a layer of cinder concrete varying from three to nine inches to furnish drainage slope; and upon this was a four-ply composition roofing covered with slag. The actual weight of trusses, beams, slabs and covering was approximately 75 pounds per square foot.

At about the center of the roof was a double eight foot ventilating fan with motor and housing weighing probably two tons. Further details of the structure are shown by the accompanying sketches and photographs.

Description of Collapse

The roof of the theatre collapsed about nine P. M. on January 28, 1922, while between four and five hundred persons, an unusually small audience, were in the building. At the time of the collapse a heavy snow storm was in progress; in fact, the heaviest since the building was constructed and which placed upon the roof a depth of snow of approximately two feet, exclusive of likely drifting.

The roof fell bodily into the pit carrying with it approximately the eastern two-thirds of the balcony. The column under the main truss which did not extend to the roof was pushed out from under the truss without being injured. This column rested on one of the balcony columns which did not fail and was joined to it by bolting through two spliced plates. The only column extending to the roof was buckled by the truss framing into it and the load of this column fell upon the balcony buckling the column directly beneath and one other column supporting the balcony.

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The main truss was practically undistorted outside the north panel where the lower chord which formed a bearing on the west wall was buckled and twisted about 90 degrees. The gusset plate above this chord was buckled and torn while the batter post and top chords were thus thrown out of line about four inches; otherwise, none of the members of the main or auxiliary trusses show indication of failure before falling.

The Columbia Road wall was found five inches out of plumb at the main bearing, shattered at the southwest corner where an auxiliary truss rested upon it, and cracked practically through its height in three other places. These three cracks show in the brick and stone facing and it has not yet been ascertained whether they extend also through the tile. This wall pulled away from the stage wall about two inches at the top and pulled that wall apart, about halfway between the stage and the Columbia Road wall.

This photograph of the north end section of the bottom chord of truss T-11 shows the effect of a twisting stress, which, combined with the bearing stress, turned the bottom chord off of its bearing on the Columbia Road wall. Note that the west flange at the end is undistorted, while the east flange is curled up against the web. This bottom chord section is the only member found to show evidence of failure before falling. The fact that the corner of the bottom west flange is not injured indicates that a twisting of this member occurred before it struck the floor. Outside of the first panel the truss appears to have been but slightly unlined during the collapse.

Fig. 10

The main truss apparently fell free of the Columbia Road wall as no scratching is evident; but the four auxiliary trusses on the east side did scar the east wall with their bearing ends during the collapse. The flanges of the bearing beams which carried the wall end of these trusses were bent downward, with the exception of the northernmost which is practically straight, and the southernmost which carried a truss independent of the main truss.

The slab was badly shattered by the fall but in the southwest corner it remained suspended without rupturing over a span of about 20 feet.

Eye witnesses testify that a crack was seen to open in the plaster up near the left of the stage and that an instant later the roof fell. A witness who sat in the balcony near the column of the main truss testified that there was no noise nor disturbance in that vicinity before the crack at the stage was noticed or before the collapse occurred. The testimony given shows rather conclusively that the initial movement, regardless of its cause, occurred in the vicinity of the west side of the stage.

This photograph shows the omission of a cover plate at the upper end of the north batter post of the main truss, and the manner in which the gusset plate buckled toward the west. The stiffness of the heavy upper chord was limited to this half-inch plate. The top chord was cut during the rescue work.

Fig. 11

Defects of Design

It is difficult to draw a distinct line between what constitutes design and what constitutes the detailed work of the designing service necessary to make it complete. Both elements, however, are a part of the whole field of design and are therefore treated together in this section. These defects are as follows:

A. Walls

(1) The Columbia Road wall of the structure was not a safe wall for the heavy concentrated load placed upon it. It was approximately 40 feet high, 18 inches thick and not integrally bonded. About 45 per cent. of its length was occupied by openings. Even a solid brick wall of this height and length would have required a minimum thickness of at least two feet to accord with good practice. (See Figs. 6 and 7.)

(2) A skew bearing was used on this wall to carry the heavy concentrated load of the main truss and no provision for anchorage was made. Such a bearing should have special consideration in its design to guard against the tendency to slide sidewise. The actual bearing surface was only six inches wide normal to the wall, and only a small movement of the wall or truss was necessary to cause unseating. (See Fig. 2.) The omission of anchorage was an infraction of the Washington Building Code.

B. Structural Steel

(1) The main column, C-2, supporting the main truss, was in itself, given no lateral bracing, and no bearing plate. Its ends were not milled and at its connection with the column below was merely bolted through two splice plates which enabled it to carry practically no stress except a simple vertical load. This condition was greatly responsible for the completeness of the collapse which occurred in the vicinity of the balcony.

(2) Sufficient lateral bracing to give the structure stiffness as a whole was not provided. This was a contributing cause to the collapse. (See Fig. 5C.)

(3) No reinforcement of the bottom chord was provided to take care of bearing stresses and of the canting action caused by the skew. This was one of the main causes of the collapse. The bottom chord shows conclusive evidence of failure through bearing.

(4) The center of stresses of the lower chord and batter post at the north end of the main truss came on the edge of the wall bearing, giving about four inches of eccentricity. This caused additional stress in the chord which was not provided for.

(5) The channel of the bottom chord extended about five and one-half inches beyond the gusset plate at the north main truss bearing without a filler between the webs so that their bearing strength was greatly reduced. These webs were thus dangerously overstressed and one of them shows every indication of having failed before the truss dropped.

(6) Moment plates on the top and bottom of the main truss were put in in sections and neither spliced nor butted together. They were thus unable to transmit the stress from one panel to the other, which forced the top and bottom chord channels to carry the full stress, this contributing greatly to the deflection of the truss.

(7) No cover plate was placed over the batter post and top chord of the main truss. This limited the lateral stiffness of the compression chord to that of a half inch gusset plate. This gusset plate failed at some time during the course of the collapse and is one of the most critical weaknesses in the steel design.

(8) Moment plates of the main truss were broken at panel points which were not supported laterally, thus decreasing the lateral stiffness of the truss. The top chord of the truss buckled at these points, probably during the collapse.

(9) The distance between stress lines in the stress diagram was used as the outside dimensions of the truss which reduced the effective depth of the main truss about nine inches. (See Fig. 5A.) This also was a factor in increasing the deflection of that truss. Also the center of stresses of the diagonals did not pass through the center of stress at the panel point.

C. Roof Slab and Loads

(1) The roof slab was too thin for the load and length of span used, and while not a primary factor in the collapse, was a distinct departure from good practice and capable of producing a local failure.

(2) The stress sheet shows no provision made for the load or vibration of the double eight foot ventilating fan carried on the roof.

(3) The actual dead load of the roof as designed and constructed was about one-third more than the load which appears to have been used in computing stresses. This added greatly to the deflection of the main truss which was an important factor in the collapse.

Defects of Construction

Defects of construction consist of poor workmanship, use of faulty materials and variations from the plans, and specifications and building regulations. If the contractor furnishes the material and builds the structure as the architect described it, then the structure's weaknesses are not considered as defects of construction for which the constructor was responsible. Defects of this nature found in the Knickerbocker Theatre were as follows:

(1) The bearing plate of beam B-24 was so placed that this beam had only a partial bearing at the wall. This defect, however, apparently had no influence upon the collapse, as it was not unseated until the truss fell.

(2) The strut over column C-2 where it fastened to the top of the bottom chord of the main truss, was provided with four holes for anchorage to that member. The chord itself, however, was provided with but two holes, thus two bolts on one side were omitted. The holes should have been bored and the bolts inserted. This strut, however, bent over against the side which was not bolted and the absence of these two bolts cannot be assigned any responsibility for the collapse. (See Fig. 5B.)

(3) A number of light colored hollow tile were used, which were considered by some to be of inferior quality, but evidence before the coroner indicates that tests of these tile have shown them to be of the usual commercial strength.

(4) The Columbia Road wall and the stage wall were not bonded for a distance of six or seven feet at the top. Such bond as existed, however, was sufficient to break the stage wall about half way between the stage opening and the Columbia Road wall so that this defect is not regarded as a contributing cause of the collapse.

Review of Other Analyses of Collapse

A number of theories seeking to explain the initial collapse of the roof have been advanced in the press and at the coroner's inquest. The evidence upon which they are based has been carefully studied by the committee which has checked practically every point mentioned with the evidence existing at the structure. It has found that some of these theories have not mentioned a number of important facts. (See Fig. 1.)

A. Theory of Joint Committee of Army and Navy Engineers

The report of the Army and Navy Engineers attributes the roof collapse primarily to failure of the bearing under beam 21. Presumably the expansion and contraction of the roof slab moved the Columbia Road wall and reduced the area of this beam's support. The bearing then failed through crushing of the tile allowing beam 21 to drop and causing the roof slab to pull beam 22 sideways toward Columbia Road until it also left its support. When these two beams fell they released beams 19b and 19c by breaking the bolts which fastened these two sets of beams at their union with truss T-12. T-12 buckled, then pulling off the main truss T-11 from its Columbia Road support, thus causing the entire roof to drop.

The condition of the steel members and wall bearings which this Committee has found at the site of the building, is incompatible with the action outlined by the above theory. That such action could not have taken place is believed to be shown by the following facts:

1. At wall bearing 22 the cement which was spilled on the bearing plate at the west side of the beam was not disturbed and a piece of the tile projecting from the wall could not have remained in place as it now does had this beam moved westward. Shortly after the accident there were distinct scratches on the bearing plates showing that beam 22 moved practically straight south. (See Fig. 9.)

2. Where each pair of beams, for example, B-20 and B-19a, framed into truss T-12 the flange of the top chord of that truss was buckled up sharply on both sides. Beams B-19d and B-23 are still hanging from the truss. On the underneath side of the top chord of the truss are distinct dents that could have been made only by a scissor action from each pair of beams as the truss preceded them in its fall. (See Fig. 6.)

3. If beam 21 had failed first, the top chord of truss T-12 should naturally have buckled first at that point, but the top chord is not buckled between beams 20 and 22.

4. The top chord of T-12 where beam 22 joins it is buckled and torn but the fracture is a clear tension failure and shows clearly the effect of the scissor action mentioned above, indicating that the fracture occurred after flange of the upper chord was pinched by beams 22 and 19-C.

5. Both beams at each connection were fastened with four bolts at their junction with truss T-12, and even if beams 21 and 22 had dropped first they could not have exerted a turning effect on T-12. The turning effect would be counter-balanced. Moreover, the top chord of this truss was imbedded in the concrete roof slab, which would greatly resist buckling before the fall.

6. If beams 21 and 22 had dropped from their wall supports and broken their truss connections, the first sign of collapse should have been the appearance of their north ends as they broke through the ceiling. This, according to eyewitnesses, did not take place.

7. That the Columbia Road wall could have been

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moved outward by expansion seems improbable as the roof slab was poured about the 1st of June and at initial set probably possessed its largest volume. Also the roof was covered with cinder concrete and 4-ply composition roofing, and it is doubtful that any material change of temperature or volume ever occurred.

Theory of Colonel P. M. Anderson of the War Department

This analysis is practically the same as that of the Army and Navy Engineers except that failure is attributed to the roof slab which presumably pulled beams 21 and 22 towards each other and off of their support. (See Fig. 1.)

This analysis is not supported by evidence in the wreckage. Pieces of slab examined directly under this point showed extra reinforcing of three-eighths inch corrugated rods which indicated that this was probably one of the strongest portions of the roof slab. The parting of this slab could not have pulled these beams toward each other, and since in the southeast corner of the building a slab of 20 feet or more is still holding together unsupported, this action appears unlikely. The same reasoning applies to this theory from the point where the two beams were unseated, as applies to the preceding theory.

Theory of Mr. T. L. Condron, Consulting Engineer, Chicago, Ill.

This theory places the immediate cause of failure in the column C-2 at the rear of the theatre. Presumably, the column failed through over-loading. This allowed the south end of the main truss to drop pulling the north end from the wall and producing a general collapse.

This theory appears entirely plausible but it is not borne out by evidence of the structure nor by evidence given at the coroner's inquest.

1. Though this column was undoubtedly weak and overstressed it underwent no distortion throughout the collapse. It is still perfectly straight and coated with about half the plaster that was originally on it.

2. Had this column failed and pulled T-11 from its bearing, the last point of contact of this truss with the bearing would have been the northwest corner of the flange of the bottom chord. A load of some 55 tons would have been placed upon this corner. That this did not occur is evidenced by the fact that this corner even now, is not bent. (See Fig. 4.)

3. An eyewitness sitting in the balcony not far from this column who saw a crack open up at the left of the stage, noticed no noise or disturbance in the vicinity of the balcony before the crack appeared.

Theory of Mr. R. M. Geare

This theory places the origin of collapse at the top chord of truss T-12 where beam 22 is attached; presumably, a weakness in the steel caused the truss to buckle at this point pushing the beams on the north side into the stage wall, this allowing T-12 to pull T-11 from its bearing. This action is believed impossible from the fact that the stage wall shows no evidence of the beam having punched through the hollow tile at the beam ends. The imprint of the beam ends in concrete that was spilled around them during construction is still intact and shows that no thrust occurred there. Moreover, the fracture in the flange of the top chord of T-12 is a clean tension break in a compression member and shows the effect of the scissor action of the beams on each side, which could not have occurred after the flange tore. The fracture mentioned appears to have been caused by falling of the truss and not by any buckling while on its bearing.

Theory of Ernest B. Ruebsam, formerly in Charge of Structural Design for the Supervising Architect

This theory places the origin of failure in the gusset plate at the north end of the truss at the junction of the top chord and batter post. Presumably, the truss buckled at this point where the lateral stiffness was only that of the gusset plate. This caused the top of the batter post to move to the west, thus unlining truss T-11 and pulling T-12 from its wall bearing on the east wall.

This theory undoubtedly strikes at one of the weakest points of the structure and is in part, concurred with by this Committee. However, the action relative to unseating T-12 appears to have been unlikely. The east end of this beam did not fall clear to the bottom but caught on an opening at the second floor lobby. Had the east end of this truss fallen first and taken this position, it would have undoubtedly pushed the end of the main truss over to the Columbia Road wall. That this action did not occur is evidenced by the fact that the north end of the main truss did not touch the Columbia Road wall in its fall.

In this theory, however, are pointed out the most important weaknesses of the structure, such as excessive deflection of the main truss, lack of splicing moment plates, overloading of trusses, and general instability of the main truss at the bearing, all of which were contributing causes of failure. Failure of the gusset plate mentioned and distortion of the lower chord of the main truss actually occurred in the collapse, but it is difficult to say how much occurred in the fall itself.

Analysis of the Engineering News-Record

This analysis attributes the initial failure of the unseating of the main bearing at the Columbia Road wall. It points out the weaknesses which contributed to this action and denies the possibility of failure having originated in any auxiliary member of the steel. In these and practically all other essential points the report of this Committee concurs.

THE HOUSE WIRING PROBLEM

The Wiring Committee of the National Electric Light Association makes an appeal to Architects

IN the March, 1922, *Bulletin of the National Electric Light Association,* is an interim report of a sub-committee of the N. E. L. A. Wiring Committee. This report proposes a classification of houses into four categories governed by the amount of wiring each house may contain.

The first classification would be when the service, meter and one or two lights have been connected. This might be described as electric service in house.

The second classification would be the case which is only too common, of one light in most of the rooms, and but little more. This might be described as electric service in each room.

The third classification would be, in the opinion of the sub-committee, the minimum for a wired house, though not a well wired or adequately wired house. This might be one lighting outlet and also one convenience outlet in each living room (bed room, parlor, dining room, etc.) and an average of three such outlets per living room. This might be described as wired.

The fourth classification would be a reasonably well wired house with at least one lighting and one convenience outlet in each room and an average of five such outlets per room. Of course, under this classification a house with only the minimum two outlets in each room and none in closets, hall ways, etc., might theoretically get in the best classification by installing a 50 light chandelier. This, however, should not interfere with the practical use of the classifications.

The practical use will be, for instance, that when two wiremen are competing and one of them cuts down the amount of wiring to reduce his price his competitor may point out that one price is for wiring the house, the other merely for bringing in service.

Another use of the classification will be that when a real estate man advertises a house as wired the central station man or electragist may go to him and tell him he should do some more wiring in order to live up to his advertising.

Still another use will be in selling additional wiring to house owners. With such a classification the man with an average of two outlets per room should be sold the idea that an adequately wired house with more outlets will add to his comfort.

The committee hopes that the foregoing classifications will be fully discussed by architects and others interested in the subject of adequate wiring, believing that great changes in this important item are pending.

Another report of the sub-committee considers the effect of diversity in the use of appliances and the lighting load.

The following recommendations regarding room demands and number of circuits required are presented. Obviously there must be a maximum limit as to the size of house to which any empirical rule, such as the one here suggested, would apply. With this clearly in mind it is suggested that three circuits be limited to residences of not more than 2500 sq. ft. floor area, and that in all cases engineering principles should be applied, taking into account length of circuit, permissible drop in voltage, etc., in determining the size of wire to use. It should be borne in mind that any general rule is subject to variation, depending on local conditions.

The 1500 watt circuit is suggested in view of the possibility of using 15 ampere fuses.

The schedule under "Room Demands" is an attempt to arrive at the demand in the different rooms, allowing for diversity between appliances and light loads.

This recommendation does not contemplate the use of heavy current consuming devices, such as ranges, electrically heated mangles, water heaters, etc., for which special provision must be made when their use is contemplated.

Suggested Circuit Arrangement	*Room Demands*
One 1000 watt or 1500 watt circuit to supply— Laundry and Basement Living Room baseboard outlets Dining Room baseboard outlets Kitchen baseboard outlets	(a) Laundry 750 watts plus 1 watt per sq. ft. floor area and not less than 1000 watts.
One 1000 watt or 1500 watt circuit to supply— Ceiling outlets in main floor rooms Ceiling outlets in halls and porches Baseboard outlets in 2nd floor rooms	(b) Living Room 500 watts plus 1 watt per sq. ft. floor area and not less than 750 watts.

XUM

One 1000 watt or 1500 watt circuit to supply—	(c) Kitchen and Dining Room (loads combined) 1000 watts plus 1 watt per sq. ft. floor area and not less than 1500 watts.
Ceiling outlets 2nd floor rooms	(d) Bed Rooms and Bath Rooms (loads combined) 660 watts plus 1 watt per sq. ft. and not less than 600 watts plus 150 watts per room.
Attic lights	(e) Attic and general basement. ½ watt per sq. ft. floor area.
Second floor halls and porches	(f) Halls. 2 watts per sq. ft. floor area.

The above are without regard to the number of outlets per circuit.

Outlets should be installed with reference to convenience rather than a definite number per circuit.

Fire Protection Meeting

THE twenty-sixth annual meeting of the National Fire Protection Association is to be held at Chalfonte-Haddon Hall, Atlantic City, May 9, 10, 11. Interest already manifested indicates an exceptionally large attendance this year, and the large increase in fire losses during the past three years, generally attributed to the "moral hazard" of business depression, makes the work of the Association a matter of increasing public interest.

A considerable number of committees will submit important revisions of standards this year to keep step with changes in industrial processes. The regulations adopted by the Association, which were at first of interest to underwriters only and valuable to them in estimating hazards in the making of rates, are now commonly used as a guide by municipal and state bodies having jurisdiction over the matters with which the regulations deal.

An official program of the May meeting, giving the nature of the committee reports and other matters to be discussed will be mailed to the five thousand members some time in April. Being an educational body the Association is liberal in furnishing copies of its committee reports and other information respecting its work to anybody manifesting an interest. The Executive Office is at 87 Milk Street, Boston, Mass.

The Lighting Fixture is a Luminaire

THE Illuminating Engineering Society announces that at the Council meeting in March, formal approval was given to the use of the word "luminaire," to designate all lighting fixtures.

This action of the Council follows the recommendation of the Committee on Nomenclature and Standards in the report presented to the annual convention of the Society at Rochester last September. An expression of opinion favorable to the adoption of the word has been received from a number of organizations. It will hereafter be employed by all illuminating engineers and salesmen of lighting service.

The word adopted is already in use in the French language in this connection and it can as readily be assimilated as the words "garage," "hangar," "chauffeur," "chassis," etc., each having displaced awkward locutions. For a long time it has been felt that "lighting unit" is clumsy and makes for confusion, the popular idea of "unit" being that it is a synonym of "standard." The introduction of new types of plugs brought in the expression "removable fixtures" and portable lamps have been termed "movable fixtures," in spite of the fact that "fixture" indicates something stationary or fixed. Luminaire will cover all these cases.

American Engineering Standards

IMPORTANT developments that have taken place in the movement to nationalize engineering and industrial standards are set forth in detail in the report now being issued relating to the work of the American Engineering Standards Committee during 1921.

The activities of the American Engineering Standards Committee have developed to such an extent that work is now under way on 79 distinct projects which have reached an official status. In its work, 160 bodies of national importance are co-operating, these having designated more than 500 individuals as official representatives to serve on sectional committees working under the auspices of the Committee.

A statement has been issued entitled "Work of the American Engineering Standards Committee, 1921" and copies may be obtained from the secretary, 29 West Thirty-ninth Street, New York City.

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The American Architect and The Architectural Review *has gratuitously set apart this section for use by The American Specification Institute.*

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The purpose, simply stated, is to afford an organization which, it is believed, will become a most important element in architectural practice and building operations, a medium through which it may, without expense to itself, reach a class of readers that are most intimately identified with the field of the activities of The American Specification Institute.

Publishers, The American Architect and The Architectural Review

SPECIFICATIONS may be divided into four classes insofar as their contents are concerned. These classes are materials, methods, construction and equipment. Many specifications and, in fact, most specifications that are used in building and engineering structures, combine three of these four elements; that is to say, for building and engineering structures the specifications will embrace materials, methods and construction while for the equipment there will be these same elements with a sub-element of installation after shop construction.

Specifications are essential to the proper and orderly conduct of the business of all those concerned with buildings, engineering structures of all classes and for all manner of equipment of whatever kind which may be placed in or about such works. We have, then, the following classification of users of specifications: Engineers, architects, contractors, manufacturers, vendors, labor, owners, buyers, operators.

Each one of these classes is vitally interested in having at his disposal good specifications, the intent and purpose of which cannot be questioned. To each of them a good specification brings the assurance that there will be smooth operation and cordial relations for all concerned, whereas mediocre specifications mean everything but cordiality and happiness.

Owing to a present lack of means for collecting and distributing information concerning specifications there is a needless duplication of study, research and labor on the part of specification writers. This condition tends to make the work seem arduous, as it is quite often, if there has been no effort expended towards meeting the conditions present in the individual office. Those specification writers who have had sufficient vision to analyze the problems that they must meet and who have attempted to organize their work in some more or less methodical fashion, have been gratified to find the time so spent has been well spent.

Practically all other professions are so organized that the interchange of knowledge peculiar to their profession, such as the deliberations of committees which formulate proposed standards for basic operations and the results of researches undertaken by scientific laboratories, is affected in such a way as to result in the improvement of the quality of specifications produced and as a direct consequence, has resulted in an improvement in the professional and business standing of their authors.

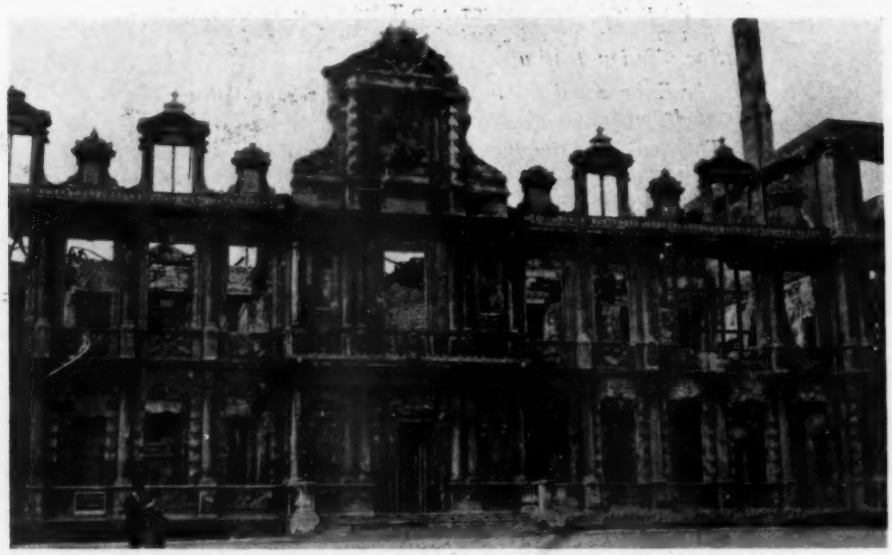
The American Specification Institute has been organized to improve all those conditions surrounding the writing of specifications and to bring to specification writers the benefits that are to be obtained from organized efforts of men accustomed to study and write these essential documents.

The activities of the Institute are divided into two major classes, viz.: (a) study of materials and methods and (b) study of the elements and the composition of specifications. It is highly desirable that one who writes specifications should know something of the production of raw materials and the method of finishing and preparing them for use. Such knowledge is informative and possession of it undoubtedly will tend towards a more intelligent selection and use of materials, thus producing more economical construction. The In-

stitute does not propose to undertake the study of raw materials—such as those that enter into the manufacture of steel, for instance—with a view to developing a specification for the manufacture of any certain basic product, but it feels that a knowledge of the physical and chemical properties is, in many cases, quite desirable in order to prevent useless or wasteful attempts to utilize a material that is unsuited or uneconomical for the purpose intended.

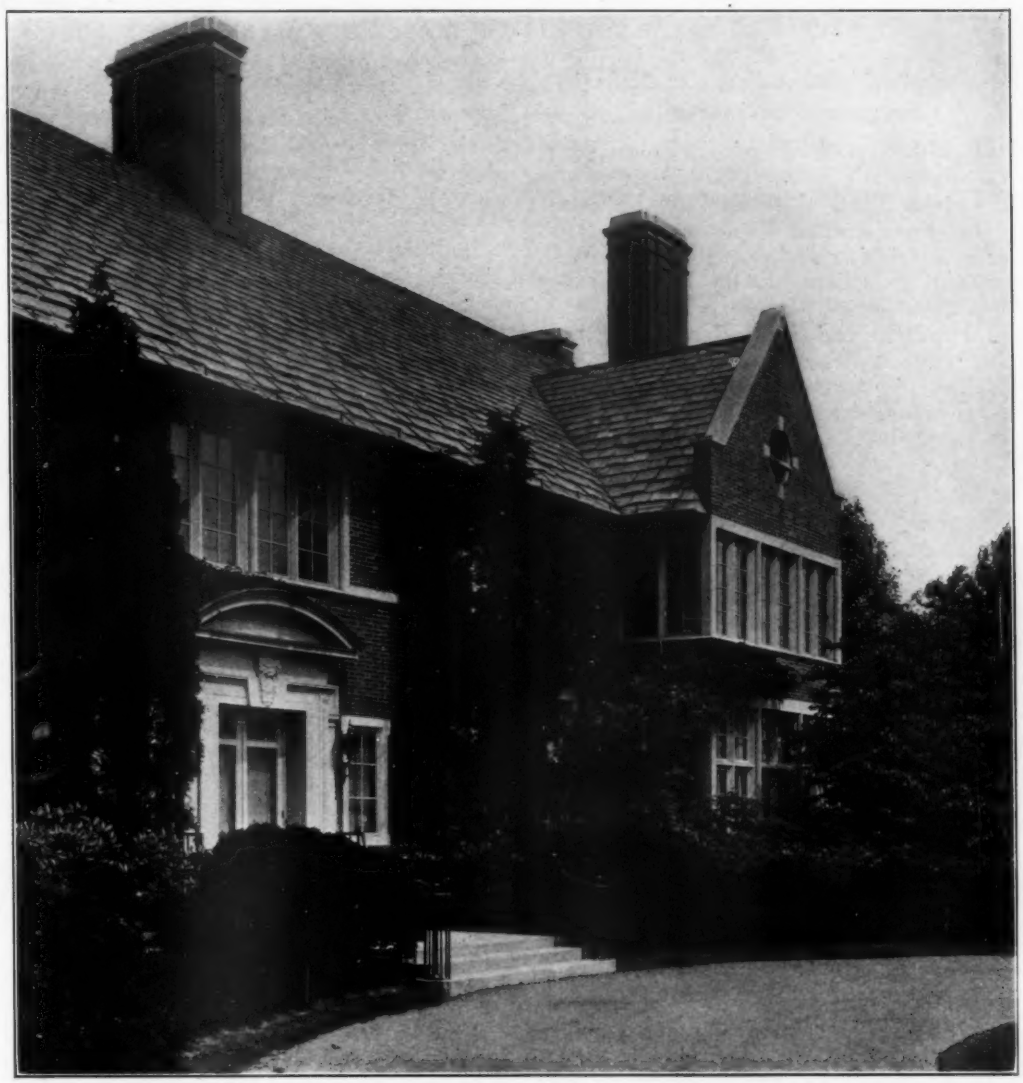
The restrictions placed on membership, namely, that each candidate must be engaged, to some degree, in specification work for building and engineering structures assures a membership with a single purpose—the study of improvement of specifications—and precludes the giving of attention to extraneous matters that might occur if the interests of the members were of a diverse character.

The membership fee is ten dollars and the annual dues twenty dollars, payable semi-annually, the fiscal year being from May 1 to April 30.



The Town Hall, Rheims

(Reproduced from a Photograph by R. M. Blackall)



Isaac T. Starr Residence, Laverock, Pa.

Charles A. Platt, Architect

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New Scholarship Established at Carnegie Institute of Technology

THE Pittsburgh Builders' Exchange has recently established a scholarship for $300.00 at Carnegie Institute of Technology, Pittsburgh, Pa. Under the terms this amount will be available each year during the life of the scholarship to be awarded to students in the Department of Building Construction, College of Industries.

Awards will be made on the basis of scholastic standing, good character, and evidence of the exceptional promise for success in the building construction industry. The scholarship may be divided at the discretion of the faculty.

Pittsburgh A. I. A. Elects at Annual Meeting

AT the annual meeting and dinner of the Pittsburgh Chapter of the American Institute of Architects, held recently at the Fort Pitt Hotel, Pittsburgh, Pa., the following officers were elected for the ensuing year:

President, E. B. Lee; vice president, Howard K. Jones; secretary, Stanley L. Rousch; treasurer, J. L. Beatty; directors, Sidney F. Heckert and Louis Stevens. A report read by T. E. Billquist, chairman of the Chapter Extension Committee showed that the membership has been increased from 69 to 97 during 1921.

Competition for Two Scholarships

TWO scholarships of three hundred dollars each are offered in the scholastic year of 1922-23 for special students in the fourth year of the course in Architecture at the Massachusetts Institute of Technology. They will be awarded as the result of a competition in design under the direction of the Committee on Design of the Department of Architecture.

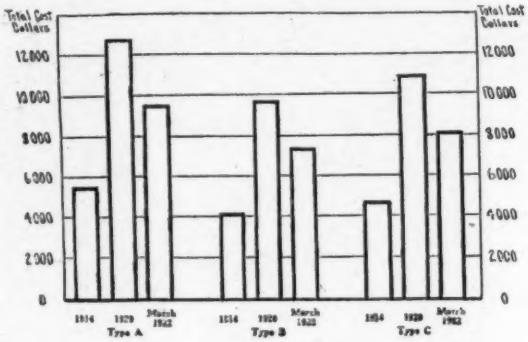
The competition is open to citizens of the United States of good character, who are between twenty-one and twenty-eight years of age, and who have had at least two years of office experience. Competitors must furthermore present satisfactory evidence of a knowledge of descriptive geometry.

The competition will be held in July, 1922. Competitors are allowed to prepare their drawings wherever conditions conform to the requirements of the Committee, but these drawings must be sent to Boston for judgment.

Applications should be received before May 15, addressed to Professor William Emerson, 491 Boylston Street, Boston, Mass.

The Cost of a Home

IN the *Chemical Bulletin*, March, 1922, issued by The Chemical National Bank of New York, detailed figures were given together with the accompanying chart. They present a comparison of the cost of building a home in 1914 with the cost of the same building in 1920, at the peak of the high price wave, and in March, 1922. The figures are for three different types of residences, showing in each case the changes in the various elements in labor and material costs.



A home of type A cost in 1914, $5,529. In 1920 the same house cost $12,815, an increase of 131% in relation to the 1914 figure. In March, 1922, such a house cost $9,502, 71% more than the 1914 cost, and 26% below the maximum cost in 1920.

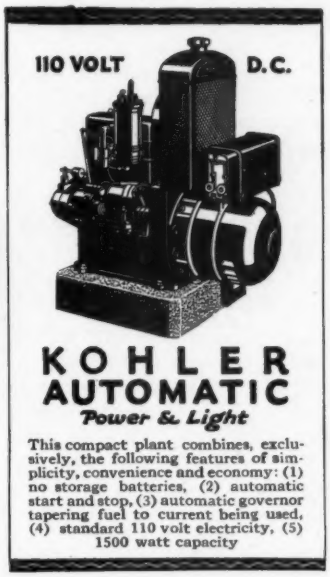
TYPE A
2 STORY FRAME HOUSE
7 Rooms—Size 30 ft. x 34 ft.
Contents 29,100 cu. ft.—Fl. Area 2,640 sq. ft.

	1914	(Peak) 1920	March 1922
Excavation	$240.00	$420.00	$420.00
Foundations and Cement	470.00	1,459.00	1,167.00
Masonry	250.00	667.00	543.00
Plastering	359.00	962.00	809.00
Carpentry and Glass	2,520.00	5,629.00	3,845.00
Painting	320.00	608.00	560.00
Plumbing and Gas	350.00	686.00	517.00
Heating	400.00	1,029.00	712.00
Metal Work	180.00	455.00	291.00
Tile Work	40.00	87.00	54.00
Mantels	80.00	173.00	109.00
Electric	250.00	500.00	377.00
Hardware	70.00	140.00	98.00
Total Cost	$5,529.00	$12,815.00	$9,502.00
Cost per cu. ft.	$0.19	$0.44	$0.325
Cost per sq. ft.	2.09	4.85	3.60
Percent of Change	100%	231%	171%

The cost of a home of type B in 1914 was $4,176. To build such a house in 1920 cost $9,767, 133% above 1914 costs. The present cost of this home is $7,374, which is 76% above 1914 prices and 24% below the maximum cost.

for RESORT HOTELS

for SUMMER HOMES



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TYPE B

2 STORY COLONIAL HOUSE

8 Rooms (Incl. 2 Attic Rooms)—Size 23 ft. x 41 ft.

Contents 25,315 cu. ft.—Fl. Area 2,530 sq. ft.

	1914	(Peak) 1920	March 1922
Excavation	$160.00	$280.00	$280.00
Foundations and Cement	410.00	1,273.00	1,018.00
Masonry	258.00	689.00	560.00
Plastering	385.00	1,031.00	868.00
Carpentry and Glass	1,030.00	2,301.00	1,571.00
Painting	304.00	577.00	532.00
Plumbing and Gas	340.00	666.00	503.00
Heating	420.00	1,081.00	748.00
Metal Work	187.00	473.00	302.00
Tile Work	126.00	274.00	171.00
Mantels	60.00	130.00	81.00
Electric	420.00	840.00	634.00
Hardware	76.00	152.00	106.00
Total Cost	$4,176.00	$9,767.00	$7,374.00
Cost per cu ft.	$0.165	$0.385	$0.29
Cost per sq. ft.	1.65	3.86	2.91
Percent of Change	100%	233%	176%

The 1914 cost of a type C home was $4,701, which by 1920 had risen to $10,913, a figure 132% above the earlier cost. The cost of erecting this house in March, 1922, is $8,112, 72% above the 1914 cost and 26% below the peak cost.

TYPE C

2 STORY SHINGLE HOUSE

8 Rooms (Small)—Size 26 ft. x 35 ft.

Contents 24,360 cu. ft.—Fl. Area 2,385 sq. ft.

	1914	(Peak) 1920	March 1922
Total Cost	$4,701.00	$10,913.00	$8,112.00
Cost per cu. ft.	$0.193	$0.448	$0.333
Cost per sq. ft.	2.00	4.64	3.68
Percent of Change	100%	232%	172%

The rise in prices and wage increases between 1914 and 1920 more than doubled building costs between these two dates. The subsequent decline, while not sufficient to restore costs to the old level, has brought about a very material decrease in construction costs, the fall in costs in two years amounting to 25% of costs at the peak.

The prospective builder is, of course, interested in knowing whether he may look for further declines, for which he should wait. It would be beyond the scope of this article to attempt to forecast the course of building costs in the future. General wholesale prices, as measured by the index number of the U. S. Bureau of Labor Statistics, seem to be stabilized at a level about 50% above that of the pre-war period. Building costs are above this level, but many of the elements which bulk large in building costs, such as freight rates and wage rates, are less susceptible to downward revision than are commodity prices in general. The general housing shortage, and the increasing volume of building at present price levels are factors which serve to strengthen building material prices. While it is entirely possible, therefore, that building costs may decline still further, it is not probable that drastic declines will occur.

Classes in Architectural Design at M. I. T.

BEGINNING July 5, and extending through to September 2, the Department of Architecture at the Massachusetts Institute of Technology will conduct classes in elementary and intermediate architectural design. Detailed information concerning other summer courses will be sent upon application to Professor William Emerson, 491 Boylston Street, Boston, Mass.

PERSONALS

Aleck Curlett, architect, has moved his office from 518 Merchants National Bank Building to 468 Union Bank Building, 325 West Eighth Street, Los Angeles, Cal.

It is announced that the firm of Hall & Bush has been dissolved, Samuel Prescott Hall, architect and engineer, continuing in business at the old address, 16 South Third Street, Columbus, Ohio.

H. T. Lindeberg, architect, 2 West Forty-seventh Street, New York City, announces the opening of a branch office under the management of his associate, John F. Staub, in the Union National Bank Building, Houston, Texas.

The firm of Honeywell & Parker, architects, 620 State Life Building, Indianapolis, Ind., has been dissolved. Wilson B. Parker is continuing his practice at the old address, Mr. Honeywell having removed to the Penway Building, that city.

Hobart Upjohn, architect, in opening his new offices in the Grand Central Terminal, New York City, takes pleasure in announcing that in his practice of architecture, he will have associated with him Aaron G. Alexander and Otto F. Langmann.

Jno. B. Snook Sons, architects, will move their offices from 261 Broadway to 52 Vesey Street, New York City, where they will occupy an entire floor, about May 1 next. The firm is probably one of the oldest architectural firms in the country, having been continuously engaged in the practice of architecture since 1837. The founder of the firm was John B. Snook. The present members are Thomas Edward Snook, John W. Boylston, Thomas E. Snook, Jr., and Herbert C. Bowman.

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Tabulation of Building Costs

Ninth of THE AMERICAN ARCHITECT'S series of cost tables, figures for which were furnished by Architects throughout the United States. The first compilation appeared in January 12, 1921 issue.

Type of Building	Location	Type of Construction	Equipment	Foundations	Total cubic feet	Cont'ct price or lowest bid	Cost per cubic foot.	When figures were taken
Apartment House	Mobile, Ala.	Fireproof; concrete; brick and tile walls; reinforced concrete floors.	Steam heat; electric light; elevator; good plumbing.	Reinf. Conc.	369,500	$185,000	.50	March, 1921
Garage	Mobile, Ala.	Semi-fireproof; brick walls; wood floors.	Steamheat; electric light; elevators; plumbing.	Concrete	202,000	36,000	.18	Oct., 1921
Residence	Mobile, Ala.	Semi-fireproof; brick and tile walls; wood floors.	Pipeless furnace; electric light; plumbing.	Concrete	56,000	21,000	.38	April, 1921
Residence	Mobile, Ala.	Non-fireproof; frame.	Pipeless furnace; electric light; plumbing.	Brick	45,600	9,000	.20	March, 1921
Offices and Bank	Little Rock, Ark.	Fireproof; reinforced concrete; first story walls stone; brick and stone above.	Steam heat; electric light; plumbing; two electric elevators.	Conc. Piers	661,000	379,000	.58	Completed May, 1921
Bank	Little Rock, Ark.	Fireproof; reinforced concrete; brick walls, faced on street front with stone; tile and hard wood floors.	Steam heat; electric light; plumbing; one elevator.	Concrete	350,000	314,000	.90	March, 1921
Commercial	Little Rock, Ark.	Fireproof; reinforced concrete; brick walls; concrete floors.	Steam heat; electric light; plumbing; two freight elevators; two house elevators; one conveyor; one dumb waiter, all electric.	Concrete	1,330,500	326,000	.24	Completed Sept., 1921
Residence	Little Rock, Ark.	Non-fireproof; brick walls; wood floors; tile roof.	Hot water heat; electric light; two baths; plumbing.	Concrete	63,200	30,000	.48	Oct., 1921
Residence	Little Rock, Ark.	Non-fireproof; brick walls; wood floors.	Hot water heat; electric light; three baths; laundry; plumbing.	Concrete	71,000	37,000	.52	Dec., 1921
Bank	Clarendon, Ark.	Non-fireproof; brick walls; floors wood except lobby concrete and marble.	Hot water heat; electric light, plumbing.	Concrete	33,250	26,000	.78	July, 1921
Residence	Fresno, Cal.	Non-fireproof frame.	Wired for electric heat; electric light; plumbing, eight fixtures.	Brick	36,448	8,000	.22	Nov., 1921
Store	Fresno, Cal.	Semi-fireproof; brick walls.	Electric and gas heat; electric light; plumbing, four fixtures.	Concrete	24,250	5,500	.23	Oct., 1921
Apartments	Fresno, Cal.	Non-fireproof; frame.	Gas heat; electric light; four plumbing fixtures each apart.	Concrete	54,080	30,000	.55	Jan., 1922
Residence	Fresno, Cal.	Non-fireproof; frame.	Heat; light; plumbing.	Brick	19,712	5,000	.25	Jan., 1922

XUM

TOWER OF S. GOTHARD, MILAN